

June 1930
First Copy
Tech 27

Construction Methods

Dumping Rock Fill
in Salt Springs Dam,
California

A MONTHLY REVIEW OF FIELD PRACTICE AND EQUIPMENT

General Construction • Highways • Buildings • Engineering • Industrial

WHEN THE JOB IS DIFFICULT GET RESULTS WITH A LINN



Here the LINN is operating on a difficult highway fill in the Black Hills of South Dakota, for Chaulk and Birdsall, contractors

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Giant power and rugged strength, plus stalwart ability to carry heavy loads and stand up under the stresses of difficult hauling, make the LINN the ideal unit for gruelling construction jobs.

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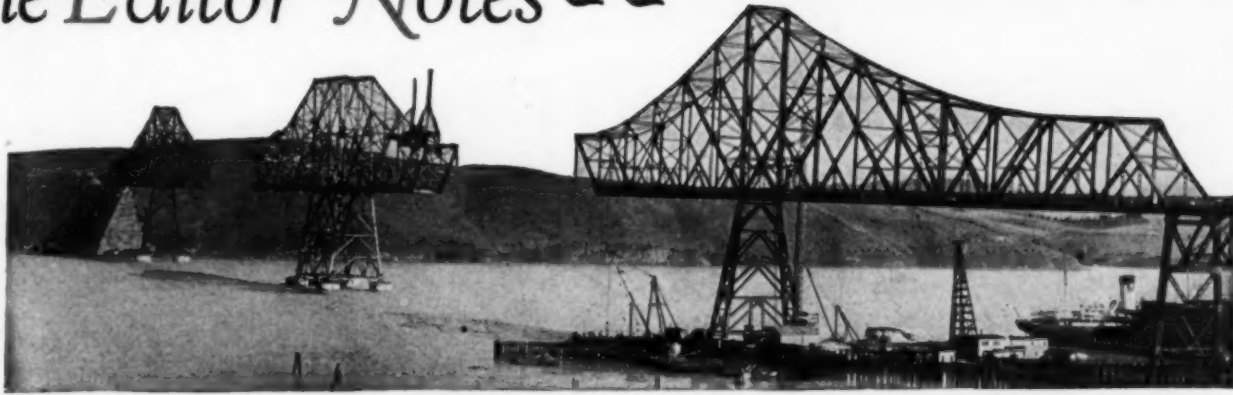
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TECHNOLOGY DEPT.

June, 1930—CONSTRUCTION METHODS

The Editor Notes --



Specify Results, Not Detailed Methods

WHERE friction develops between contractor and engineer on public works construction its cause can often be traced back to the specifications and their interpretation. Speaking before the recent board meeting of the Associated General Contractors, Major-General Lytle Brown, Chief of Engineers, U. S. Army, offered the following constructive comment on this subject: "The greatest general fault that I have noted in specifications is the same that is found in faulty military orders. They often devote too much effort to the way things are to be done and so lose sight of the results to be obtained. A clear statement of the results to be obtained and the leaving of the methods to the resourcefulness and initiative of the contractor is the proper way to draft them. In many cases, the contractor is so bound by prescribed methods that all responsibility is taken from him, and failure is then chargeable to the man who drew the specifications and not to the contractor. I have recently seen specifications which leave too much to interpretation, and so give to the contracting officer the opportunity to be unduly severe. There should be possible but one interpretation to a specification, and that a reasonable one."

Repair Parts and Tinkering

"Let me show you how most of you work with your repair parts problem," said W. R. Sostheim, president of the Chicago Equipment Distributors' Association, in a recent address before the Illinois Association of Highway and Municipal Contractors. "On a new machine a part breaks. Right away you order four new parts. In the eyes of your superintendent or foreman, who happened to run a mixer at one time, the engineering department of the factory is all 'wet.' They don't

CONSTRUCTION METHODS

A monthly review of modern construction practice and equipment

ROBERT K. TOMLIN, Editor

Editorial Staff

VINCENT B. SMITH NELLB FITZGERALD
J. I. BALLARD (San Francisco)

WILLARD CHEVALIER, Publishing Director

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Tenth Avenue at 36th Street, New York

know anything about making machines, even though they do spend hundreds of thousands of dollars for engineers. In his judgment the equipment should have some hickies and gadgets and one thing and another attached. Also, it should be changed around here and there. The consequence is that, due to his lack of experience as an equipment manufacturer, something else breaks and you have ordered, within sixty days from the time you bought that new piece of equipment, several hundred dollars' worth of repair parts. You and your foreman believe you have bought a piece of junk. This information is then broadcast, when really the fault lies right at home."

COMING

A Series on Subway Construction

Construction of New York City's new \$650,000,000 subway system, which has a route length of 59 miles and a total length of 180 miles of single track, involves tunnel and cut-and-cover operations in all kinds of material from solid rock to quicksand.

Contractors on the numerous sections of the system have developed economical and ingenious methods of handling excavation, sheeting, shoring, underpinning, street decking, and removal of spoil. River and land tunnels have been driven by the shield method.

Construction Methods soon will start a series of pictorial articles covering important features of the subway work.

Prequalification Cuts Defaulted Contracts

ADVOCACY of prequalification of prospective bidders on contracts before accepting bids was given strong support by Thomas H. MacDonald, chief, U. S. Bureau of Public Roads, in his address before the executive board meeting of the Associated General Contractors in Washington last month. He declared that since the inauguration of the prequalification program in his bureau, the number of defaulting contracts has been reduced 83½ per cent. Mr. MacDonald declared that there can be no competition helpful to the public that is based on a system which pits an inefficient contractor against an efficient one, and that prequalification is the most effective agency for the elimination of unwise competition.

Next Road Show at St. Louis

St. Louis, Mo., was selected by the American Road Builders' Association at its annual business meeting in Washington, D. C., last month as the scene for the 1931 convention and road show, to be held in January. Factors influencing its selection were the tremendous road-building programs of the central and southern states and the central location and convention facilities of St. Louis.

A questionnaire to the Association's membership revealed an overwhelming majority in favor of locating the 1931 meeting in the Middle West.

Iowa Limits New Grading Contracts

Grading contractors who have not previously done work in Iowa, according to a policy announced by the state highway commission, will not be awarded contracts involving more than 150,000 cu.yd. on their first successful bid.

"To Cut Costs to a Minimum"

IN an advertisement that appeared recently in *Engineering News-Record* a prominent firm of engineers said of its staff:

"Our men are trained to cut costs to a minimum—by construction methods and by plant management and use."

Sound practice indeed, and quite in keeping with the prevailing idea in every department of American industry. We have learned that more intelligent planning and more efficient methods are the truly sound basis for lower costs.

Construction Methods is doing its bit to help toward this essential objective. It seeks to gather and present concisely the data and information that will facilitate such training. It is constantly on the watch for stories of accomplishment that will help construction men everywhere to a knowledge of economical

methods and more effective use of materials and equipment.

In this issue, for example, a roofing contractor shows us a wrinkle that may mean new economies in the attachment of steel roof decks. From California comes a story of dam-building that illustrates one method of dealing with the plant problem on a remote job. An unusual attack upon a submarine pipe job is shown on page 53 (look it up) while elsewhere a contractor records a different approach to another pipe-laying difficulty. In the "Getting Down to Details" section, a bridge erection manager shows us a rope tramway applied to viaduct construction.

And, of course, there are many more; for each issue of *Methods* is dedicated to the principle here set forth—that economical engineering in this day and age demands a broad and intelligent knowledge of "construction methods and plant arrangement and use."

Willard Chevalier
Publishing Director

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Illustrated in the pages of this book are interesting photographs of the M-W "AIR KING" in action—important features and engineering de-

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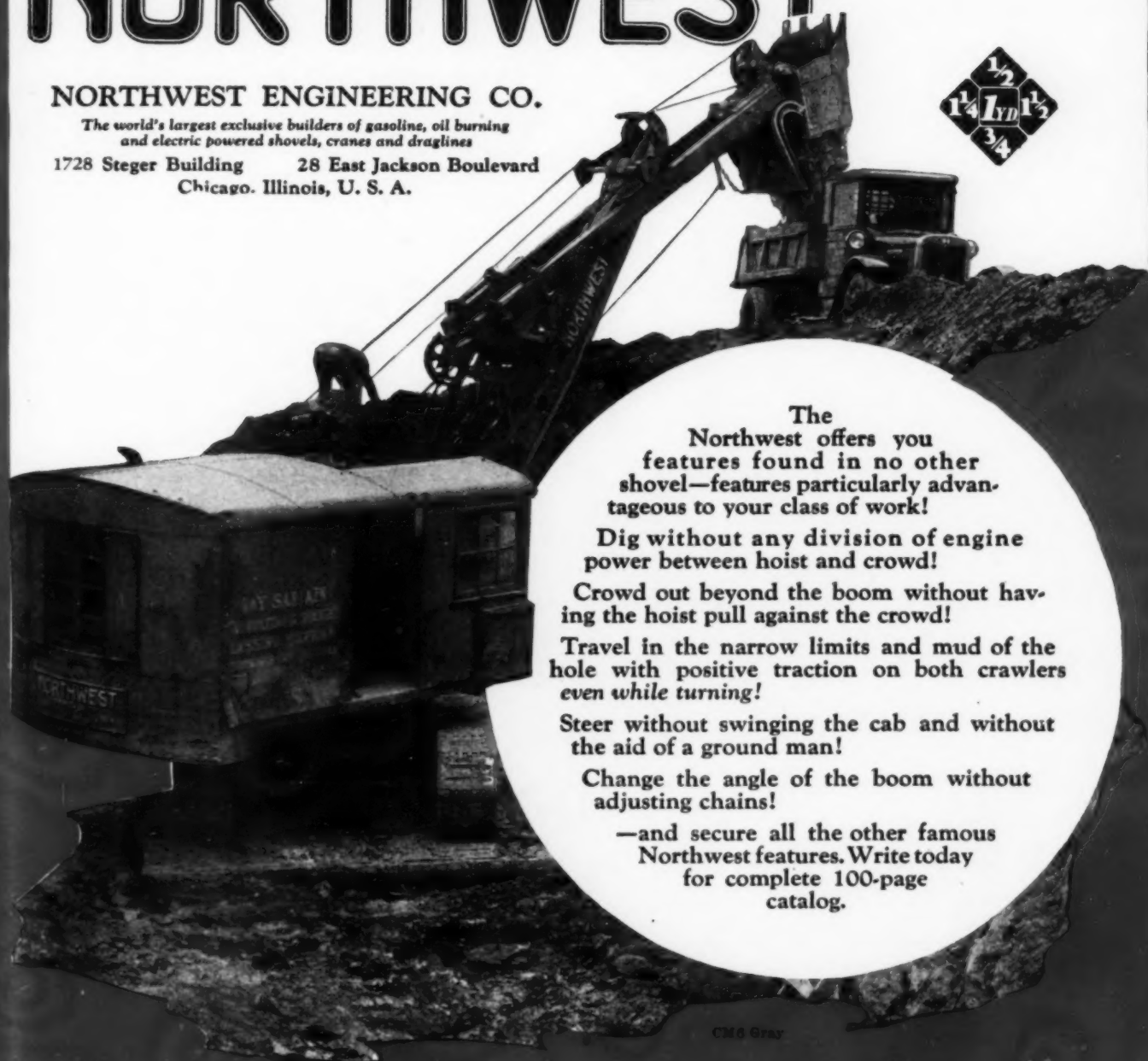
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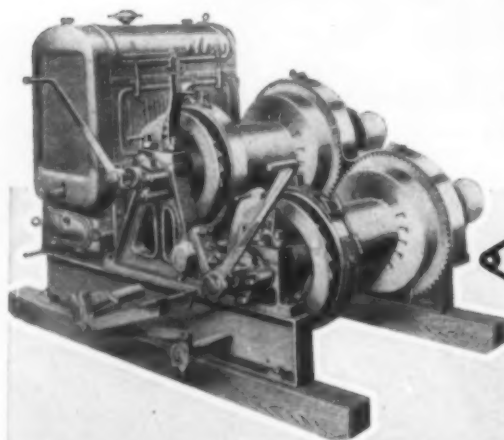
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Breaking Records :-

Time after time, Clyde hoists have broken records and established new marks for endurance and performance. Their exceptional stamina and efficiency enables the construction crews to push ahead at top speed day after day; no shut down or delays to hold up the job.

On the bridge job near Fisk, Mo., S. J. Cohen set a new pile driving record for the state with his Clyde 35 horsepower, two drum gasoline hoist.

A new gasoline hoist bulletin gladly sent upon request.



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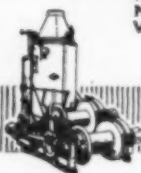
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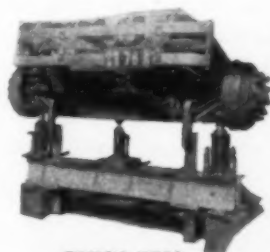


UP SHE GOES — Load and All — With One Hand

LIKE a helping hand of giant power, Blackhawk Hydraulic Jacks have come to the aid of truck owners and drivers, by revolutionizing jacking.

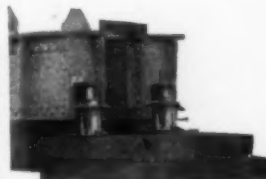
Now, when a tire goes flat under a truck loaded to the limit, there's no need to dump the load or waste costly time in laborious mechanical jacking.

With a Blackhawk, the job is quick and easy. One hand quickly places the jack. Easy strokes raise the load—and its own weight lowers it safely. Driver's time is saved—daily tonnage increased—price of the jack soon repaid! That's why Blackhawks are standard on the leading heavy trucks, and truck fleets. See your truck dealer. Mail coupon to us.



TRUCK USES

A Blackhawk does more than lift — it straightens axles, presses on gears and bushings, and handles bending jobs of wide variety. Time savers on the road. Money savers in the shop. A full line, 1 to 75 tons capacity, and each a one-hand jack.



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Blackhawk hydraulic power is used by leading construction firms the world over — for lifting massive steel girders, moving heavy machinery, replacing derailed cranes, lowering tanks, skidding bridges, bending pipes and conduits, and other operations.

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Good quality writes its story in LINK-BELT performance on the job



NO delays and practically no repairs in three years, is the gist of the story of service rendered by this Link-Belt Crawler Shovel-Crane-Drargline, Type K-1 belonging to Jas. J. Parks Company, of Omaha.

Mr. George Parks writes: "We have given our Link-Belt Crane the hard jobs, and it has always delivered. During the three years we have

owned it, the machine has never been the cause of a single moment's shutdown of our paving or grading operations.

"Our repairs so far have been practically nothing, and we do not expect the shovel will need much of anything in the way of an overhaul this winter.

"As to speed of operation, it has always handled as much or more material than the rest of our equipment can take care of."



THIS Link-Belt 1-yard Shovel is shown working in very springy or wet ground at the power house site for the Cushman project, for the City of Tacoma, on Hood's Canal near Potlach, Wash.

This 2-year-old Link-Belt Shovel is the property of C. H. Galloway, and at the time of the report he had moved between 200,000 and 250,000

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does the contract price allow?



A-86

Bids that must be screwed down to the last dime, offer attractive profits only through lowered costs. Here's a way to widen the gap between cost and contract price.

Bucyrus-Erie equipment knocks the props out from under ordinary excavating costs. Making records for speed, standing up under gruelling day-in-and-day-out service, *earning bigger profits*. Bucyrus-Erie shovels, draglines, clamshells, dragshovels and cranes—all types of power—have earned outstanding leadership in construction work everywhere.

Let us tell you how a Bucyrus-Erie will put profits into your job against the stiffest competition.

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Strip the veneer of stone or brick from the modern building and you disclose a framework of Steel—the backbone of present-day construction. Gigantic strength is here combined with simplicity of design and perfect adaptability to the needs of architects and engineers.


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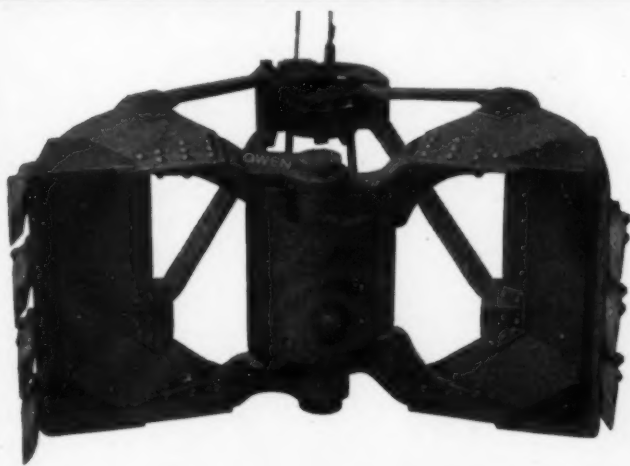
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Why An Owen Penetrates Deep and Dumps Clean

OWEN Bucket shells being free from ledges or projections inside the jaws, practically eliminate resistance to compact or sticky material entering or leaving the bucket. This feature, added to an Owen's concentration of weight low in the construction, effects deep penetration and clean dumping. The results are, in the words of the Owen Guarantee, "a mouthful at every bite" and "a bigger day's work than any other bucket of the same weight and capacity." Send for a Folder illustrating and explaining this and 16 other vital points that assure Owen efficiency, endurance and economy.

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16. Heavy duty high carbon drop-forged steel teeth.
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THE SKYSCRAPER—a study of its economic height—by W. C. Clark and J. L. Kingston. 164 interesting pages of facts, charts, tables and drawings. *Published by the American Institute of Steel Construction, New York. \$2.*

Is THE skyscraper an economic fallacy? A fire hazard? An assault on public health and safety? Shall it rise still higher or be banished from the face of the earth?

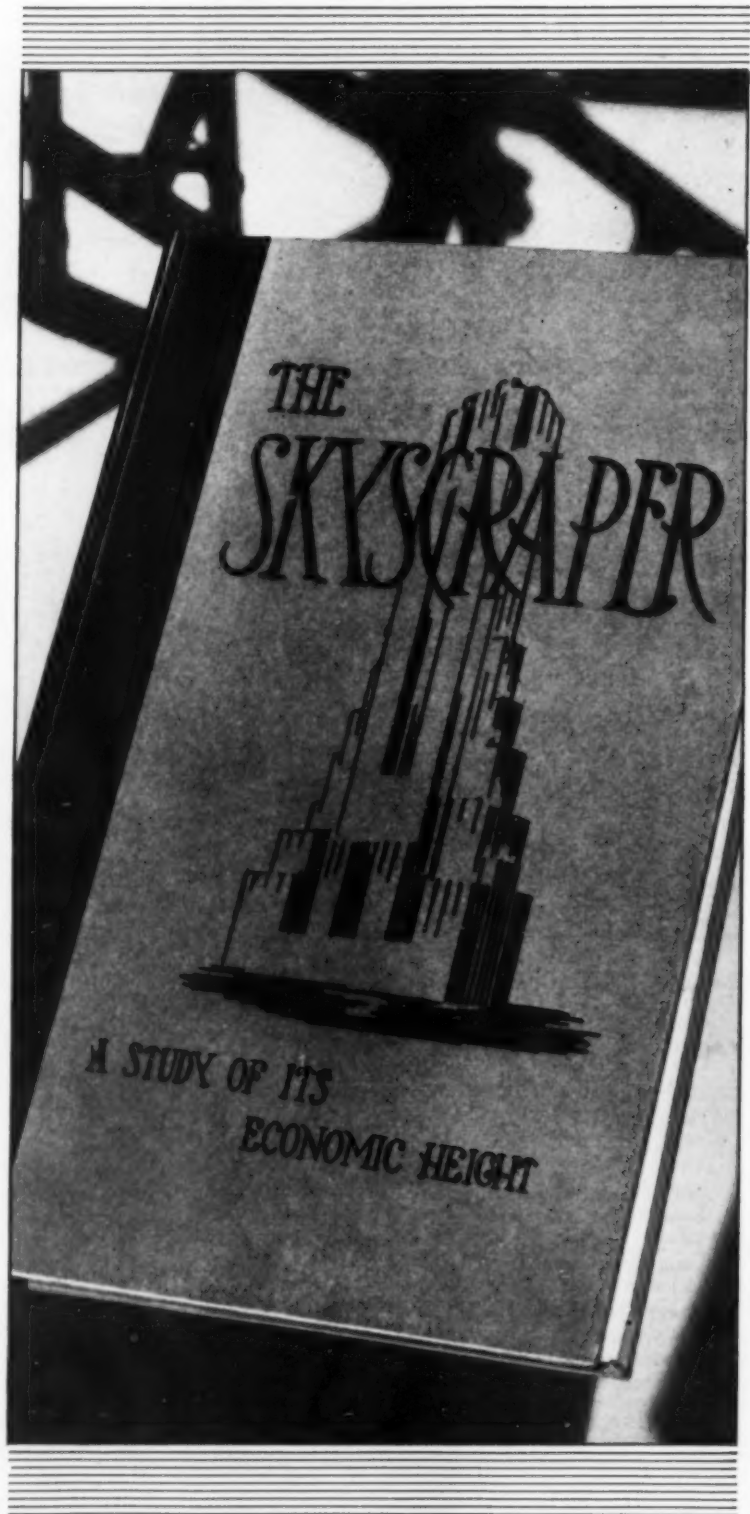
Into the raging controversy comes this clear, calm brief for the skyscraper. While admitting that the extremists are not all on one side, the authors recognize in the attacks of many *antis* "the eternal prejudice against 'the new' . . . which less than a century ago caused German doctors to protest against a railroad on the ground of danger to the health not only of those who dared to ride on it, but also of those unfortunate citizens who could hardly escape injury to health from observing the trains racing along at 20 miles an hour."

Which side of the question are you on—and how far? Here's red meat for the *antis* as well as the *pros* and information so authoritative and comprehensive that no steel man, no architect, builder, executive or metropolitan realtor can afford to be without it.

Send check to the New York Office for your copy before edition is exhausted.



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An Economical Shovel Rope—and WHY

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But that is not all. It costs money to put on a new rope and production work stops while it is being done. The long life of "HERCULES" makes changes less frequent, which means a big saving in both time and money.

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Six years of operation in all kinds of service, all over the world, have failed to indicate a single weak point in the fundamental design of the 2-Speed Center Drive Crawler, standard mounting on all Lorain machines.

THEW LORAIN



features of the 2-speed **center drive crawler**

Center Drive specification applies the power directly from motor to crawler drive.

2 Speeds in either direction. Low gear doubles the power ratio for traveling on inclines or through soft going.

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Extended "64" and "68" Tread Crawlers (applied to the same basic Center Drive design) give greater support for crane, clamshell, dragline, or backdigger operation. Rocker arm action on extended crawlers holds the nose up when ground is soft.

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simplicity of design, fewer parts, rugged construction keeps maintenance cost low.

THE 2-Speed Center Drive Crawler is the standard mounting of the 1¼ yd. Lorain 75, the 1 yd. Lorain 55 and the ¾ yd. Lorain 45. ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲

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¾ to 1¼ and 1½ yd. shovels, cranes, clamshells, draglines, backdiggers.

Gas, Diesel, Electric and Steam Powered.



Extended Center Drive Crawler with rocker arm action.



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Convertible

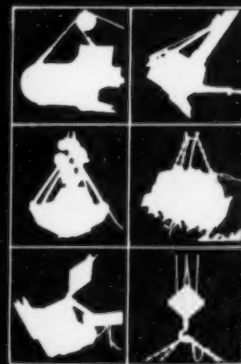


A 1 $\frac{1}{4}$ yard OSGOOD Victor Clamshell owned by Louis Petrillo, Inc., general contractor at Mount Vernon, N. Y., handling sand and gravel from barges to hoppers. Mr. Petrillo says, "I am very much pleased with the work done by this crane. I have had several other cranes, but none has given me the satisfactory service the OSGOOD has. My repair bills have been considerably less and the gasoline consumption reduced."

CHANGED in the FIELD TO ANY SERVICE

NO CHANGES IN OPERATING
MACHINERY NECESSARY

OSGOODS are convertible right on the job for many different services—shovel, dragline, clamshell, crane, or backhoe. It isn't necessary to change the operating machinery—just change booms, Reeve the cables, start the engine and go to work. Powered with a husky six cylinder engine or single electric motor, the simply designed and sturdily built operating machinery handles all services with a new high efficiency. Even in the toughest going that would quickly 'break' an ordinary machine, an OSGOOD is on the job year in and year out giving trouble free service and piling up profits. Write for OSGOOD facts.



Six services are regularly used on OSGOOD machines—shovel, dragline, clamshell, crane, backhoe and magnet. The OSGOOD shovel boom and handle are the armored type giving maximum strength and resiliency. The crane boom is the bow type ruggedly built in two sections, and equipped with a built-in tagline. A universal fairlead is furnished for dragline service.

THE OSGOOD CO.
MARION OHIO

The Story Behind Our Concrete Highways

*.....reveals some vital
facts about the modern
way to cure concrete...*



THE road building of today shows a big advance over the road building of even a few years ago. In curing methods especially, the difference is marked.

Cumbersome and costly cover methods are being replaced by the use of Calcium Chloride. The big gang needed to handle cover material is being replaced by one man with a spreader. The uncertainties of sprinkling and constant inspection are being replaced by the sure work of natural moisture from the atmosphere.

Whether spread on the surface or used as

an admixture, Calcium Chloride accelerates the set of concrete and gives it greater-than-normal early strength. Both methods are approved by the United States Bureau of Public Roads.

Write today to one of the member companies for full information about these time-saving, money-saving methods. Ask for booklet 342.

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CALCIUM CHLORIDE

CURES CONCRETE

"it's ★!—!×! expensive"



That's what everybody USED to say about shallow grading

*"A milling machine
—not a battering ram"*

Putting a heavy excavation tool in to take out a 6-inch cut runs the cost 'way up. That was before the Haiss Excavator came along to demonstrate how easy it is to put light excavation on a profitable basis.

Now, 14 to 20c a yard, placed in the truck is a fair estimate of shallow grading cost, including 6 to 10c a yard depreciation (both are too high) on the machine. These are not theoretical figures, but are averaged from costs reported on representative jobs in different localities.


You can make money with a Haiss Excavator. Get acquainted with the work it has done—see Bulletin 629.

GEORGE HAISS MFG. CO., INC.

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(Representatives in Principal Cities)

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HAISS

EXCAVATOR

Only One Lunch



BARBER



Bucket Comes —to This Pit

And one self-propelled machine is the entire digging, screening and loading plant



When the 7 o'clock whistle blows only one man goes to work in this pit.

He's superintendent, engineer, operator, shovel gang, water boy and everything.

He and this brand new Barber-Greene One-Man Sand and Gravel Plant handle every operation—digging the material from the bank—elevating it to the screens—taking out the oversize—separating the sand and gravel—loading the sand or gravel into truck or wagon.

This plant is Barber-Greene Bucket



Loader with a special, built-in, high-frequency Leahy Screen.

The loader digs from bank and elevates the material to the primary screen that takes out oversize.

This screened material drops onto the Leahy Screen, which operates at 1600 v. p. m. for perfect separation of sand and gravel.

Either sand or gravel can be delivered into the waiting truck or wagon at $\frac{1}{2}$ ton per minute rate, by making one throwing a lever.

Up, up goes efficiency and screening



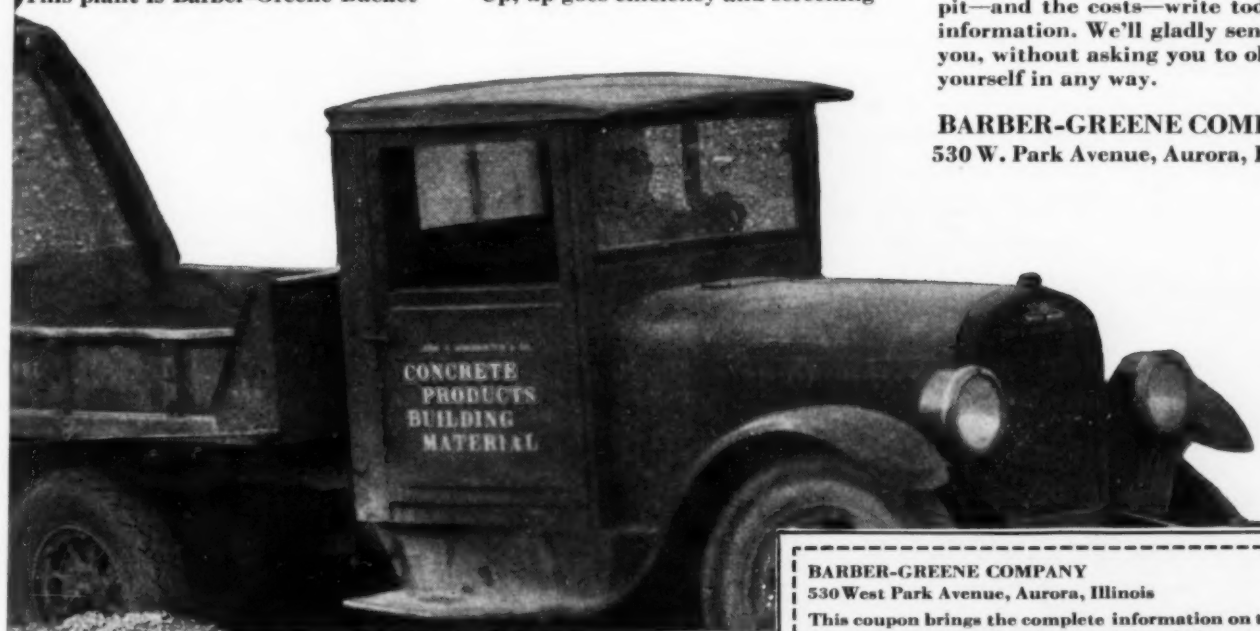
ability until it equals that of many big plants.

Down, down go costs, both initial and operating. One machine is the only investment. One machine is the only operating expense. One man is the entire operating force.

This latest Barber-Greene is the newest, most inexpensive answer for small pits—for infrequent operations—for townships or counties furnishing their own sand and gravel—for big pits demanding utmost flexibility.

To check its application to your own pit—and the costs—write today for information. We'll gladly send it to you, without asking you to obligate yourself in any way.

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This coupon brings the complete information on the New Barber-Greene One-Man Sand and Gravel Plant, for which we haven't room in this advertisement. Send it today.

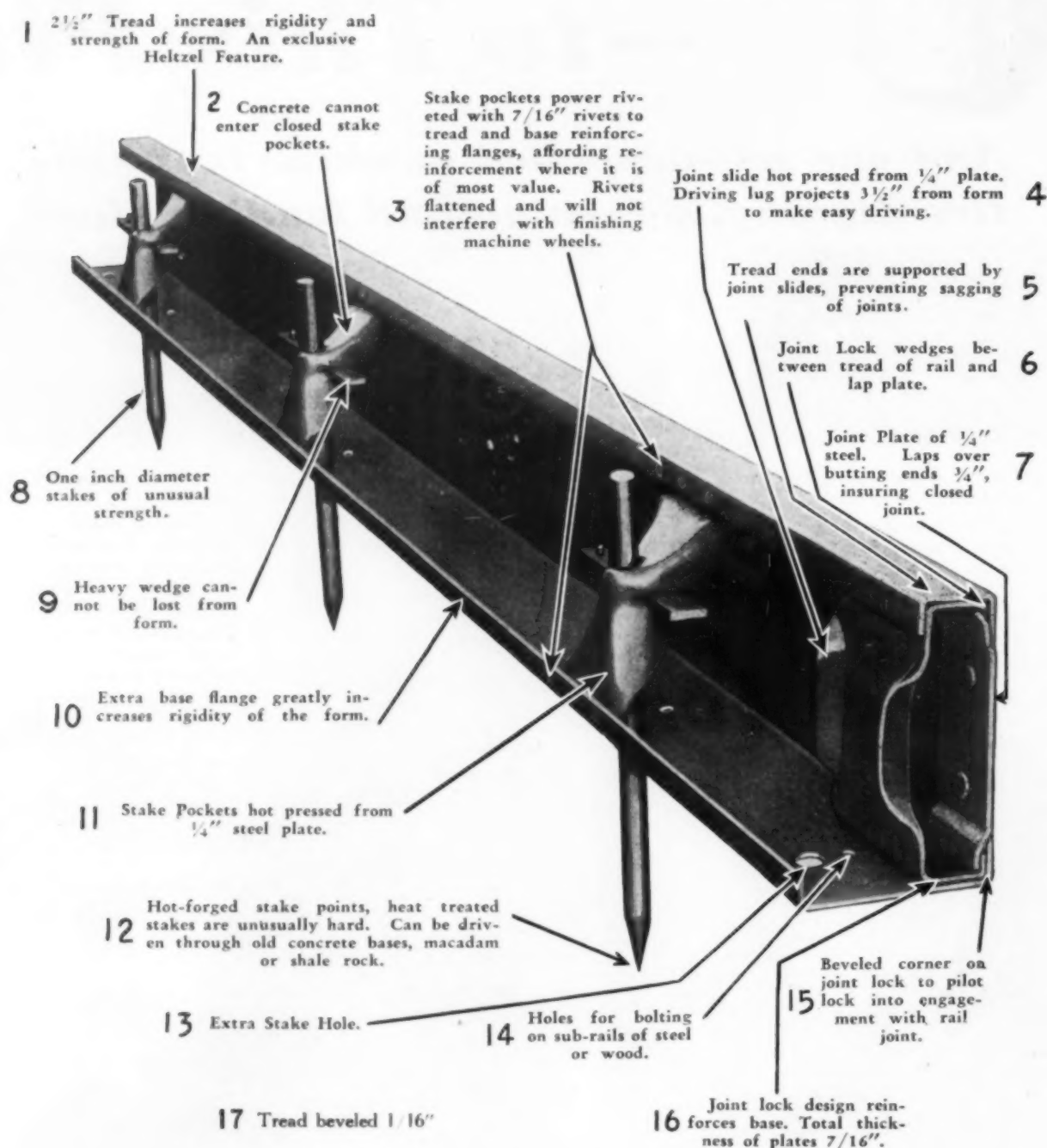
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17 Reasons

why you will prefer
this form!



The seventeen points mentioned above are all actual reasons why you will prefer Heltzel Superior Lock Road Forms, once you have used them. These features explain why Heltzel Road Forms are easier to set, and why you have fewer rails thrown off the job for repairs.

However, there is only one way to find out how all of these advantages will help in solving your form problems. Put a few Heltzel Superior Lock rails on your next road job, and compare them with the form you now use. A trial will convince you.

**The
HELTZEL STEEL FORM & IRON COMPANY**
Warren, Ohio



REDUCE THE COST
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NUT TURNING
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Now used on Piers of new Hudson River Bridge,
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Use the
FAVORITE REVERSIBLE RATCHET **WRENCH**

that avoids the lost motion of the open end wrench, with its part turn and a fresh hold on the nut method.

The FAVORITE Wrench does not leave the nut until operation is completed.

Has the socket form of head encompassing nut on all sides with an equal application of pressure, and therefore less liable to slip off the nut.

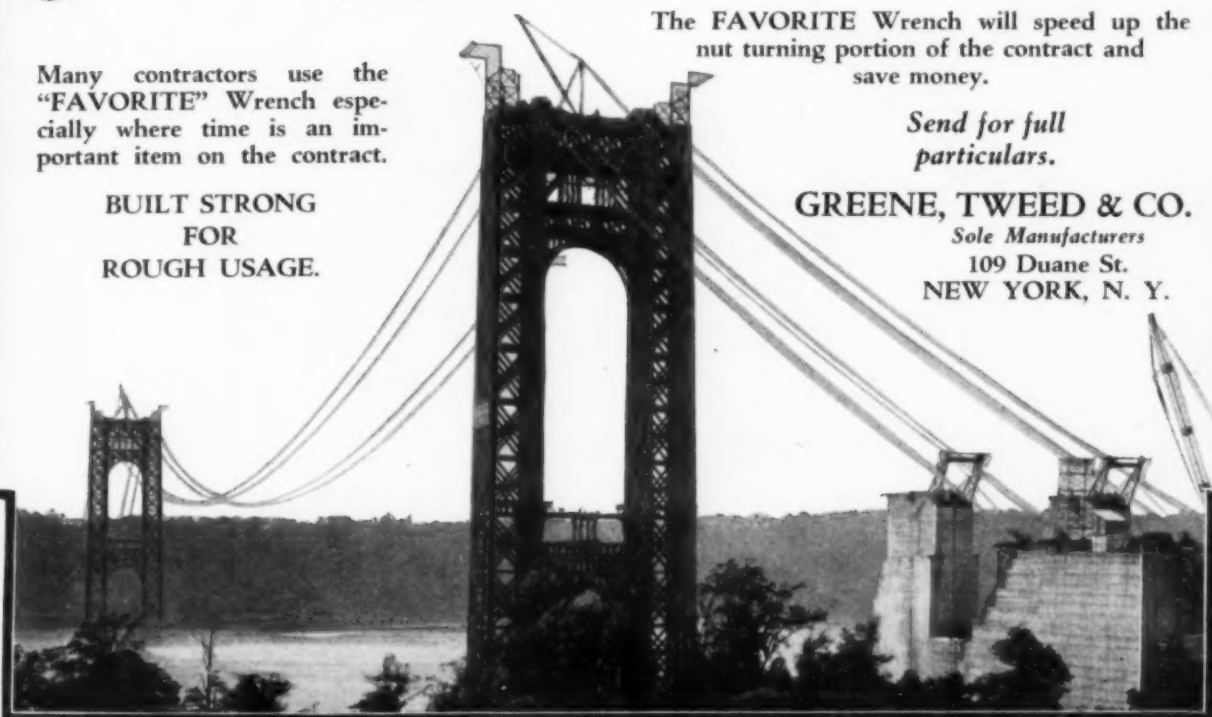
Many contractors use the
"FAVORITE" Wrench especially where time is an important item on the contract.

BUILT STRONG
FOR
ROUGH USAGE.

The FAVORITE Wrench will speed up the
nut turning portion of the contract and
save money.

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READY MIXED CONCRETE PLANTS

HEADQ

A SMALL INVESTMENT—A COMPLETE PLANT

The efficient plant of the Scranton Ready Mixed Concrete Co., Scranton, Pa., is an illustration of Blaw-Knox ability to design and furnish complete equipment for the PRODUCTION and HAULING of Ready Mixed Concrete.

- the moisture-proof Cement Bin
- the conveyor arrangements
- the 51-ton self-cleaning Batchplant with a double Weighing Batcher for the sand and stone and a separate Weighing Batcher for the cement
- and three Blaw-Knox AGITATOR Truck Bodies which haul the mixed concrete and prevent segregation of the aggregates.

The entire plant layout is a product of Blaw-Knox engineering experience and skill.



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by



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QUARTERS

Agitator
TRUCK
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Complete equipment for the Ready Mixed Concrete Industry is designed and built with the engineering thoroughness characteristic of Blaw-Knox.

for

READY MIXED CONCRETE

Equipment

- ...STEEL BINS of all capacities and varied designs for aggregates and cement.
- ...WEIGHING BATCHERS for sand, stone and cement.
- ...WATER CEMENT RATIO MEASURING TANKS for accurate control of water measurement with correction for moisture in the aggregates.
- ...AGITATOR TRUCK BODIES for hauling mixed concrete without segregation.

Ready Mix Plants throughout the country—fleets of Agitator Truck Bodies—many efficient and money-making COMPLETE UNITS are evidence of Blaw-Knox ability to really help those who contemplate going into the ready mixed concrete business.

Blaw-Knox will prepare a complete plant layout for you. This experience—this engineering service—is valuable.

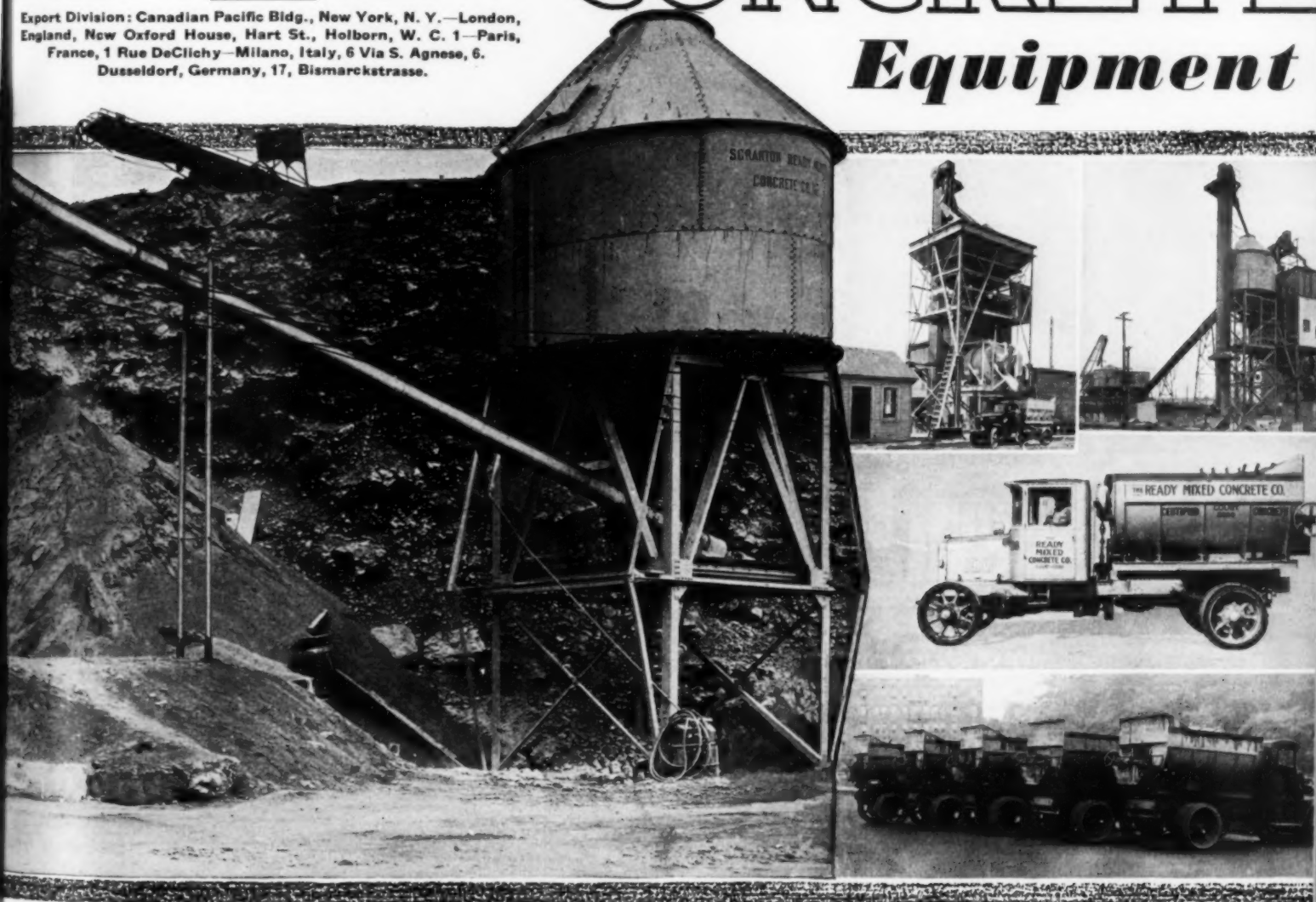
—It is yours without obligation.

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All Prices F. O. B. Factory

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-and no time
lost for
repairs



TWELVE months ago Platte County, Mo., added a Cletrac to the county's equipment. It was a Cletrac "40"—famous for power and dependability. One of its first jobs was grading and dragging 120 miles of roadway. Within one year's time this rugged Cletrac rolled up a total of 2000 working hours—and no time lost for repairs!

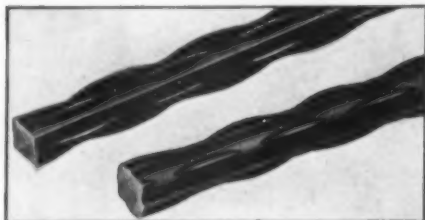
Such performance is typical of Cletracs. Inbuilt stamina is one of their strongest characteristics. They have proved their ability to stay on the job day after day and month after month—to keep going without loss of time for adjustments or repairs. That is the kind of service Cletracs are giving to thousands of satisfied users.

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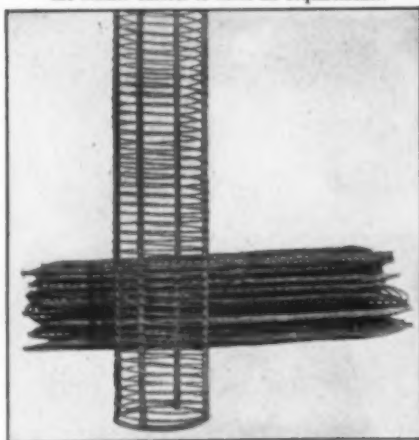
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Reinforcing Bars—Havemeyer square and round deformed bars of constant cross section.



Tying, Spacing, Supporting Devices for correct placement and rigid holding of bars in the forms. Inserts to meet all requirements.



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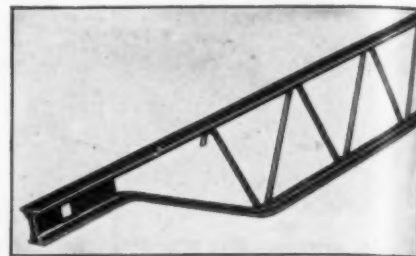
When you order your reinforcing and fire-proofing materials from Concrete Steel Company, you secure everything you need in a single purchase at the one source. That in itself means substantial savings. But more than that, our warehouse service—cutting, bending, fabricating, scheduled deliveries—saves you time and worry in bringing your materials to the job on time and right. Remember! Back of your order stands our experience of twenty-five years in close co-operation with contractors and builders. Literature on "Modern Concrete Reinforcement," "Economical Concrete Road Reinforcement" and "Havemeyer Steel Joist" will be sent on request.



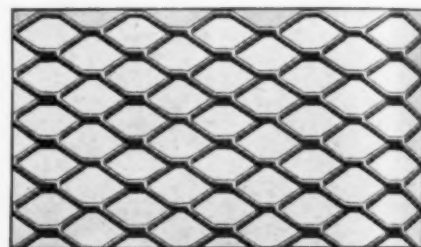
Havemeyer Barmats for concrete road reinforcement. Electrically welded units adaptable to wide range of specifications and road construction methods. Also Hoosier Asphalt Joint, Center Plate, Dowels, etc.



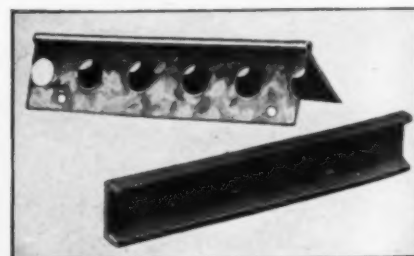
Removable Metal Centers—For forming ribbed concrete floors. Adaptable to all types of buildings.



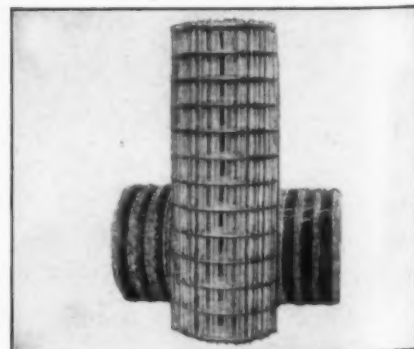
Havemeyer Steel Joists—For economical fire-safe floor and roof construction in all types of light-occupancy buildings.



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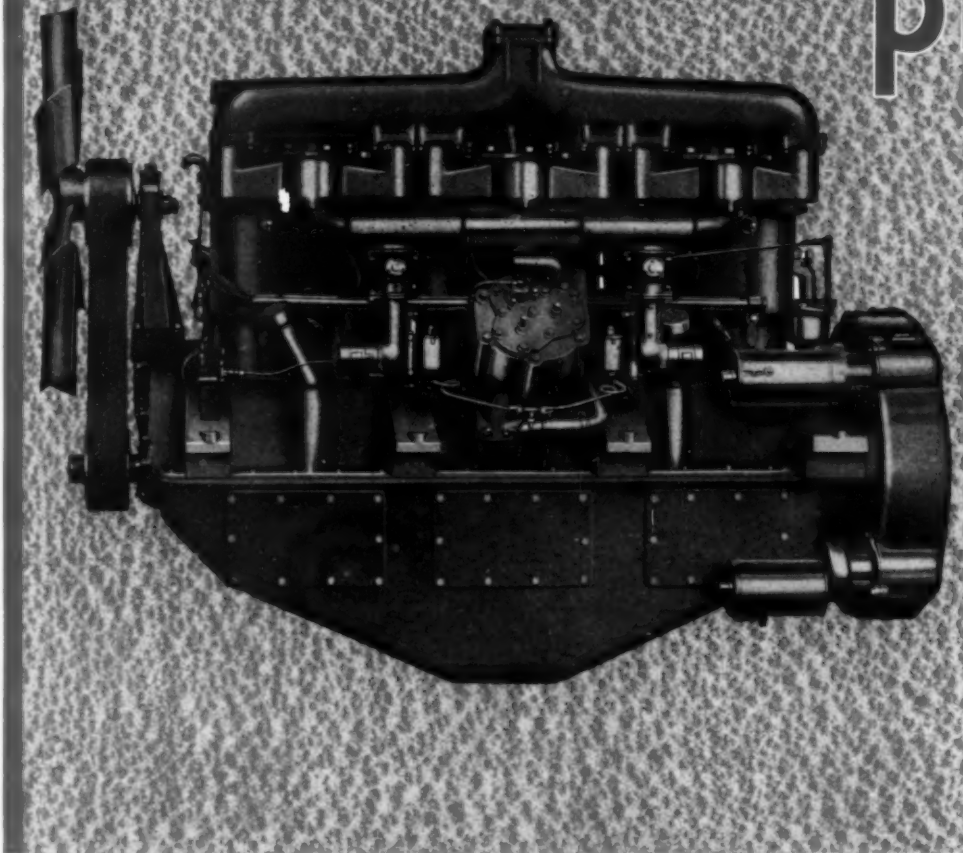
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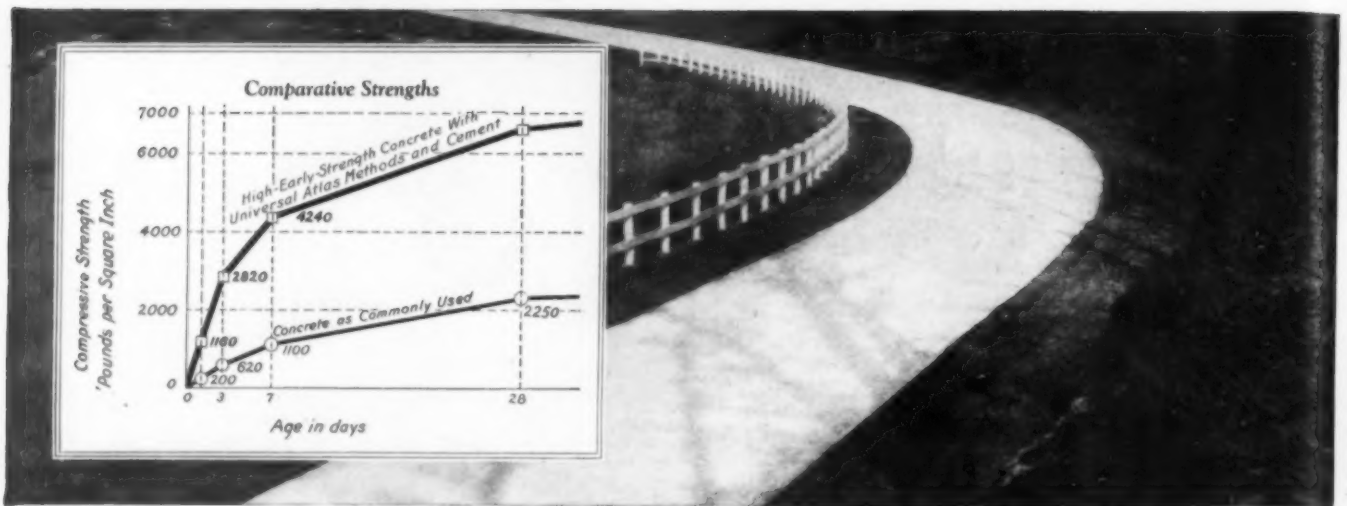


WHETHER they are gouging out the deepest excavation . . or spinning the propeller of the loftiest aircraft . . gasoline engines have but one function . . that is to supply ample power dependably . . . Le Roi Engines furnish uninterrupted power . . give action always to construction equipment, serving a wide range of applications. They are engines, tried, tested and proven . . the choice of contractors the world over who depend upon such machinery for profit. Standardize on Le Roi powered equipment . . it is a profitable policy.

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High-early-strength concrete furnishes you with several good talking points:

1. High-early-strength concrete, made with Universal Atlas methods and the standard portland cement of the Universal Atlas Cement Co., is stronger in from 2 to 4 days than concrete as ordinarily mixed and placed is in from 21 to 28 days (see diagram above).
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Construction Methods

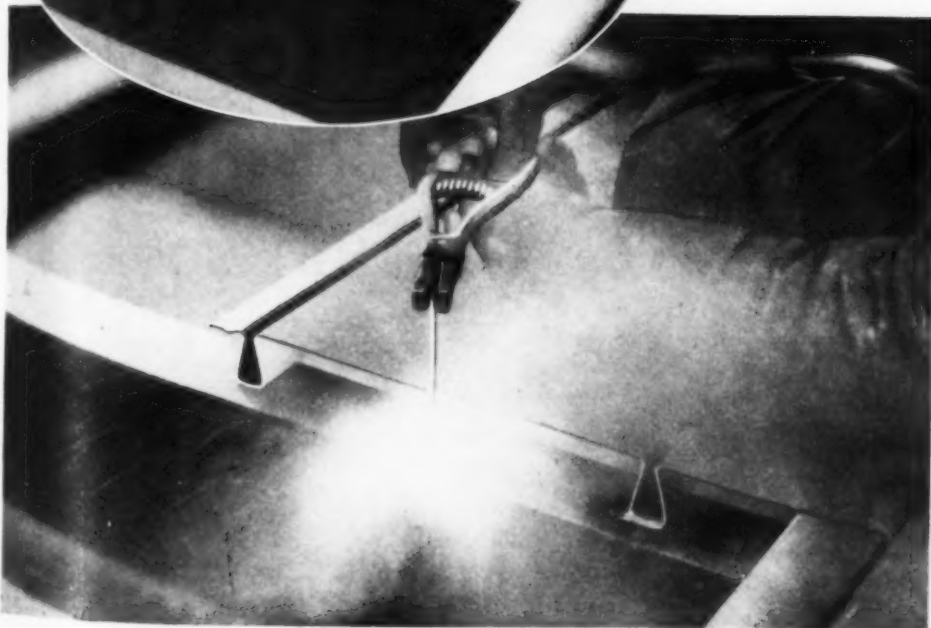
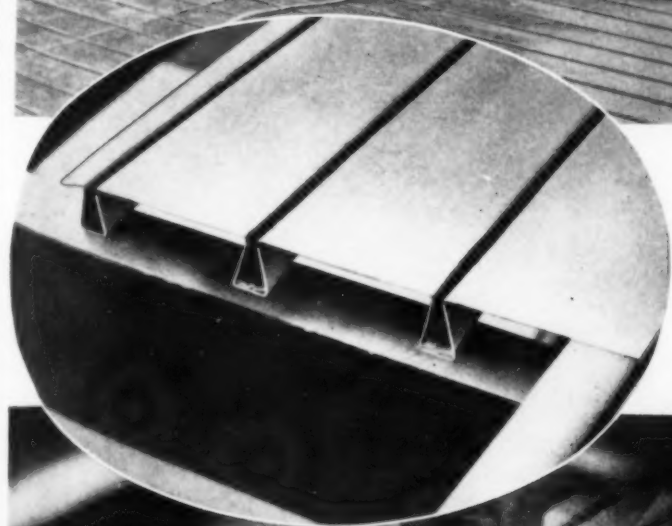
A MCGRAW-HILL PUBLICATION—ESTABLISHED 1919

ROBERT K. TOMLIN, *Editor*

VOLUME 12

NEW YORK, JUNE, 1930

NUMBER 6



Steel Roof Deck

ARC WELDED

to Purlins, Eliminating Clips

ARC welding of steel roof decks to purlins instead of the usual steel-clip method of attachment was employed on the new cold draw building of the Babcock & Wilcox Tube Co. at Beaver Falls, Pa.

The Fenestra Construction Co., under sub-contract with McClintic-Marshall Co., general contractors, did all the welding from above, using 99,700 sq.ft. of Holorib copper-bearing steel roof deck. In 16 working days 20 men with two motor-generator sets laid 1,000 squares, this speed being made possible by fastening the end of each sheet at the base of the middle two ribs, the other end being telescoped 3 in. into the preceding unit. All welds were painted before being lapped. The steel decks were covered with $\frac{1}{2}$ in. of insulation and three plies of asbestos waterproofing felt.

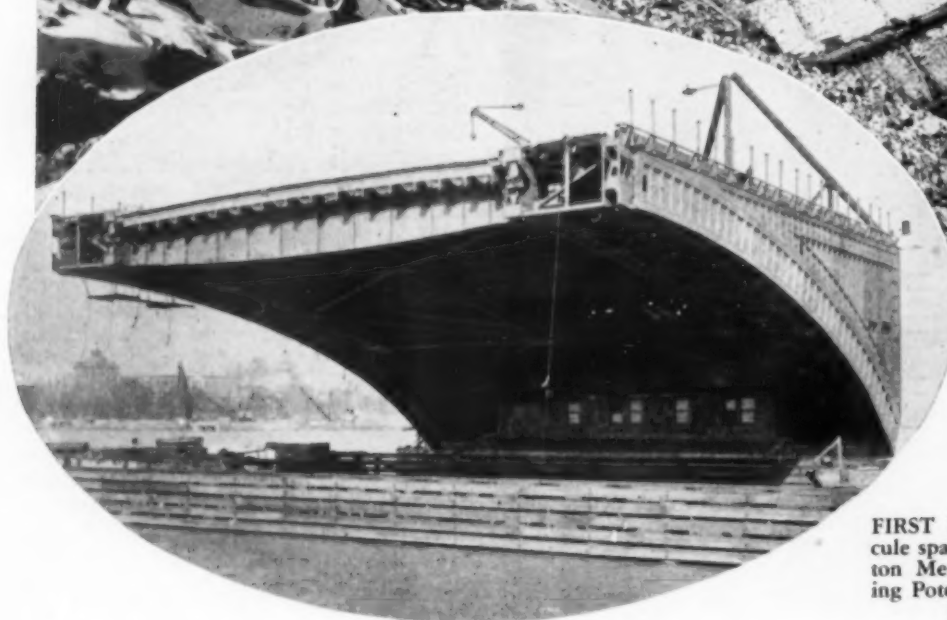
Welding the center two ribs of each Holorib sheet, made the roof sufficiently strong to withstand an inside pressure of 85 lb. per square foot.

This Month's "News Reel"

BOULDER DAM SITE (*below*) where U. S. Bureau of Reclamation will build huge structure in Black Canyon of Colorado River.



NIGHT AND DAY shifts speed construction of approach to \$12,000,000 Suisun Bay bridge, California, for Southern Pacific Railway. Bucyrus-Erie diesel shovel loads 16-yd. Le Tourneau wagon hauled by Caterpillar tractor.



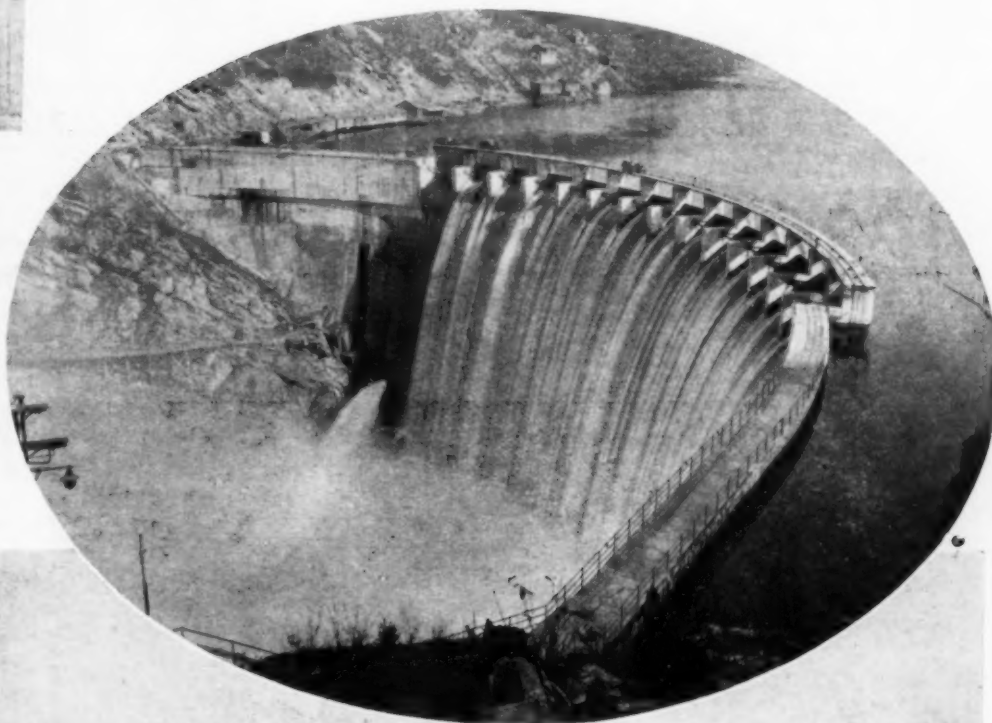
ROCK FILL totaling 3,000,000 cu.yd. nears finished grade at 328-ft. high Salt Springs dam under construction on Mokelumne River, California, by Pacific Gas & Electric Co. (See illustrated article on p. 34 of this issue.)

FIRST LEAF (*left*) of bascule span installed on Arlington Memorial Bridge crossing Potomac River at Washington, D. C.



MEMORIAL TO ENGINEER. Statue of the late Samuel Rea, president of the Pennsylvania Railroad from 1913 to 1925, was unveiled in New York April 9, in the Pennsylvania Station, designed and constructed under his supervision.

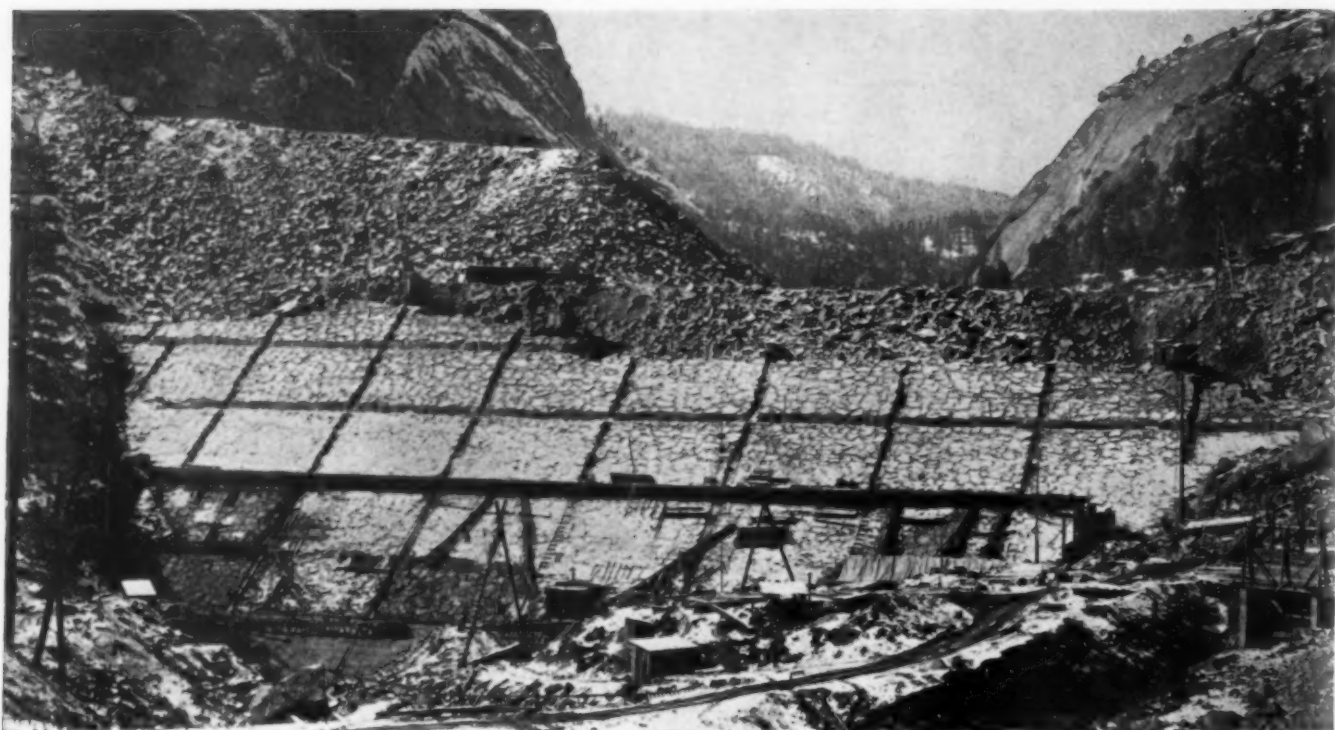
PIGEON RIVER DAM (right), North Carolina, is placed in service for Waterville hydro-electric development of Carolina Power & Light Co. Dam is arched concrete structure 180 ft. high and 870 ft. long.



WORLD'S BIGGEST BUILDING officially opened May 1. Merchandise Mart, Chicago, \$35,000,000 structure, contains 4,000,000 sq.ft. of floor space, accommodating permanent population of 30,000 people. John Griffiths & Son Co., general contractor.

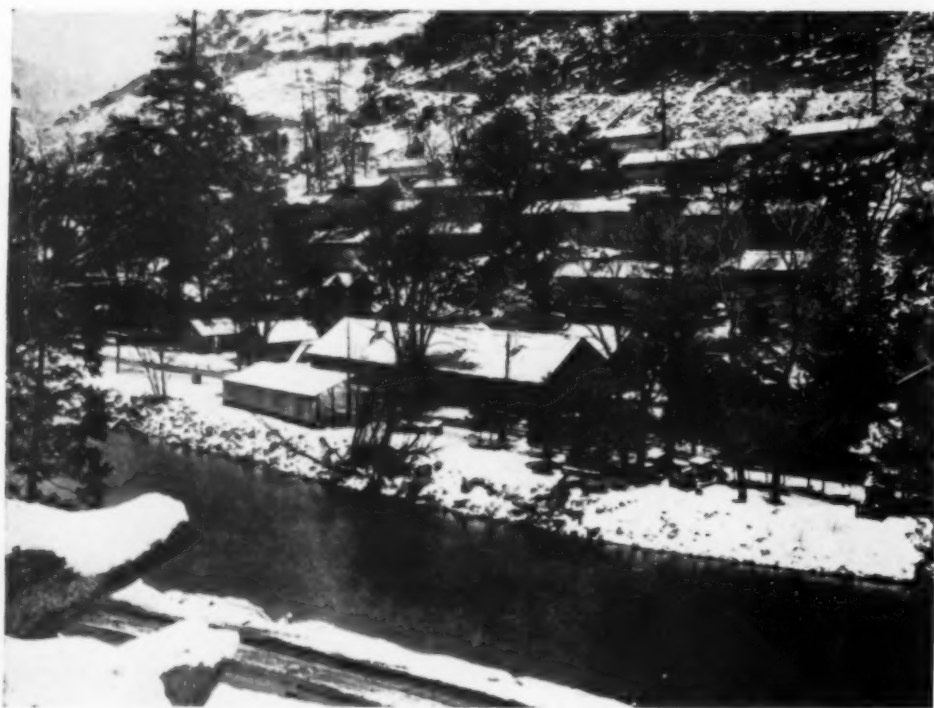


KILL VAN KULL BRIDGE is latest steel structure to provide important traffic link between Staten Island, New York, and New Jersey. Under direction of Port of New York Authority American Bridge Co. is erecting 1,675-ft. steel arch.



UPSTREAM FACE of dam is protected by 15-ft. layer of derrick-placed rock, to be covered with reinforced concrete slab. Channels in placed rock form ribs under joints of 60-ft. square concrete slab panels.

Dam Builders Quarry and Place 125,000 Yd. of Rock per Month



CONSTRUCTION CAMP housing 500 men is electrically equipped throughout, including kitchen and bakery. Treatment plant purifies sewage before discharge into river below camp.

LARGE scale quarry operations feature construction work on the record-breaking 328-ft. Salt Springs rock-fill dam on the Mokelumne River in California now being built by the Pacific Gas and Electric Company under the direction of O. W. Peterson, engineer of general construction for the company. The schedule calls for quarrying and dumping 125,000 cu.yd. of granite per month for two years to make the 3,000,000 cu.yd. volume required for the dam. In addition, 220,000 cu.yd. of this rock must be rehandled, piece by piece, to provide the placed rock section on the upstream face. Finally, 30,000 cu.yd. of reinforced concrete slab is being poured on the placed rock to form the waterproof upstream facing. This construction work, which is using electrical equipment almost exclusively, is being carried on at an inaccessible location 50 miles from a railroad with trucks as the sole means of transportation. The remote location of the dam site was the determining factor in selecting the type of structure which will store 130-

000 acre-ft. as part of a hydro-electric development on this river.

Transportation—A construction road 30 miles long from the highway was built and surfaced with 50,000 cu.yd. of crushed rock to withstand the heavy trucking over a 3-year period. Grades were limited to 8 per cent except for a few short stretches of 10 per cent grade in the direction of the load.

To furnish electric power to the site, a 40-mile transmission line was built from the nearest point on the company's system. The power line voltage is 60,000 volts for the first half the distance and then is stepped down to 17,000 volts for the portion along the construction road to permit tapping for road construction.

Camp—A construction camp for 500 men consisting of 20-man bunk houses together with a dining hall, offices, shops and other camp buildings was built in the steep canyon directly below the dam from lumber cut by a sawmill erected at the site. The water supply is obtained from the river upstream from the dam and all waste water and sewage passes through a treatment plant be-



PLACED ROCK on upstream face is handled by crawler cranes, which lift rocks up to 10-ton weight in wire rope slings. Small rocks for filling in are moved in skips. From cutoff wall, in foreground, protrude grout pipes and dowel rods to tie into concrete slab on slope.

fore being returned to the streambed.

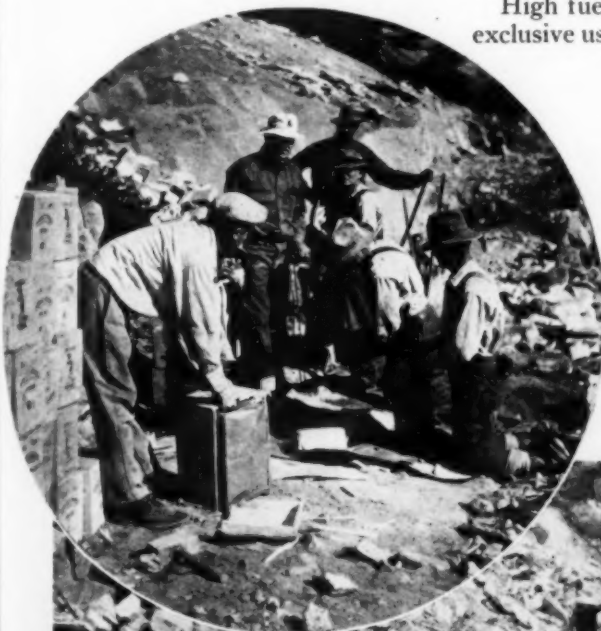
High fuel costs at the site resulted in exclusive use of electrical power. About

4,000 hp. of installed capacity is used at the site including electric equipment in the kitchen and bakery. Individual substations are provided at several points to transform to 2,300 volts for major power installations. The main compressor plant consists of Ingersoll-Rand compressors, two driven by 300-hp. motors and one driven by a 150-hp. motor. From this plant air is piped to all construction work at the site. The wage scale for common labor is 50c. an hour with a charge of \$1.25 per day for board and room, the company furnishing cots and mattresses but not blankets.

Construction Steps—Behind a timber crib diversion dam a 19-ft. diameter tunnel was driven under one abutment for a diversion tunnel to be used later for the main outlet from the reservoir. The dam site was stripped to bedrock, about 310,000 cu.yd. being removed by power shovels and trucks. Boulders which were excavated were used as fills in the dam but the finer material was useful for leveling around the camp site in the steep canyon.

A cutoff trench 6 ft. wide with a maximum depth of 20 ft. was excavated in solid granite along the upstream toe and filled with concrete. A row of holes will be drilled into bedrock in the bottom of the cutoff trench for grouting.

After the site had been stripped, quarried rock was dumped from both abutments, the fill being built out across the canyon as the work progressed. On the downstream face the rock is allowed to roll to a natural angle, the plan call-

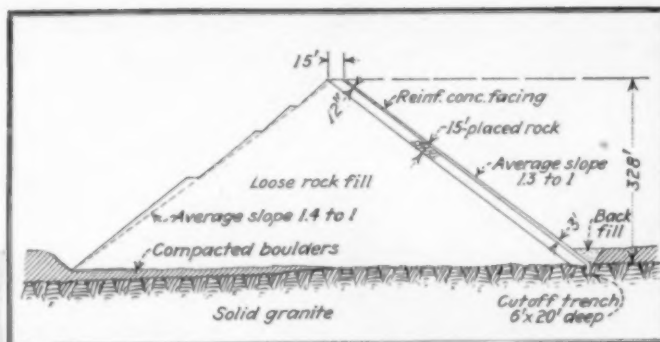


EXPLOSIVES CREW (left) loads holes for quarry blast. Vertical holes are 60 to 180 ft. deep, 20 ft. apart, and 30 to 45 ft. back from face. About 50 tons of dynamite breaks 200,000 yd. of rock.



TRACK-LAYING GANG at work in quarry. After construction, track is moved by mechanical shifter. Storage-battery locomotives handle one- and two-car trains of 30-yd. drop-door cars.

MAXIMUM SECTION of dam (right) is 328 ft. high, from bedrock, to crest. Crest length is 1,300 ft. Thickness of concrete slab facing varies from 3 ft. at bottom to 1 ft. at top.



SPILLWAY EXCAVATION, amounting to 500,000 yd., is loaded by 2-yd. electric shovels into 9-yd. crawler-mounted trailers, specially reinforced for rough usage.

ing for a finished down-stream slope of 1.4 to 1. On the upstream slope cranes pick up the rock and build up a placed rock section, 15 ft. thick meas-

ured perpendicular to the face. The large rocks are chinked in with smaller ones to provide an even and nearly continuous backing for the concrete slab to

be poured on this surface. Grooves are left in the placed rock at 60-ft. intervals in both directions, which will allow for concrete ribs under the edges of the facing panels.

Quarry Practice—Rock is quarried from the solid granite cliff on both abutments. Three main quarries at different levels were opened in the north side and the spillway excavation is providing about 500,000 cu.yd. of rock from the south side. The largest quarry is at an elevation about midway between streambed and dam crest and was planned to yield about 1,300,000 cu.yd. of material. The scheduled output from the quarries of 125,000 cu.yd. per month has been maintained on an average even during the winter period and the maximum month's output was 140,880 cu.yd. during June, 1929. This material, for the record month, was loaded with two 4-yd. Bucyrus-Erie electric shovels in the main quarry and one 1½-yd. and one 1-yd. electric shovels in the spillway quarry. Work in the quarries is carried on for two 8½-hr. shifts per day.

Methods in the quarry feature the breaking down of large volumes of rock with "big shots." Vertical holes are drilled with electrically operated Armstrong churn drill rigs. Two of the largest shots required about 50 tons of explosives each and brought down approximately 200,000 cu.yd. of granite at each shot.

Material from the main quarry is transported by 30-cu.yd. standard-gage



ELECTRIC SHOVELS of 4-yd. capacity load rocks up to 12 yd. in size at the quarry. Each shovel averages about 850 yd. per shift. Rocks too large to handle are reduced by jack-hammer drilling and further shooting.

drop-door railroad cars handled in one- and two-car trains by 20-ton storage battery locomotives. The two 4-yd. electric shovels handle rock up to 12 cu.yd. in size and load approximately 850 cu.yd. per shovel per shift.

The spillway quarry is equipped with two 2-yd. electric shovels loading into 9-cu.yd. tractor-drawn Athey trailers, the short haul and frequent shooting making railroad equipment impracticable.

Upstream Facing—The placed rock section is built up with $\frac{3}{4}$ -yd. power shovels converted into cranes. Starting with two cranes near the base because of the small area, additional machines were added as the width increased, until five are in use and possibly more will be added later. This work is the governing factor in the speed of construction work on this type

of dam and no effort is spared to make it effective. With a crew of six men per shift each crane will place about 3,000 cu.yd. per month working two shifts per day.

On the placed rock section a reinforced concrete slab is poured which varies from a thickness of 3 ft. at the bottom to 1 ft. at the crest. The slab is poured in 60-ft. square panels with the edges resting on ribs of concrete provided in the grooves left in the placed rock section. A large size rock-crushing and concrete plant was built high up on the south abutment to provide capacity for permitting a continuous pour for each of the panels. The three lowest rows of 60-ft. facing panels above the vertical cutoff were poured behind wood forms 3 in. thick which were left in place to provide protection and waterproofing below the

outlet elevation. Above this elevation sliding steel forms are used to pour the slabs. The forms are 8 ft. wide and 62 ft. long, their weight being sufficient to hold them against the headers and winches are provided to raise them during the pouring operation.

Concrete for the upstream facing slab is hauled from the mixing plant in cars by a cable to a point opposite the face of the dam and carried in chutes to a hopper on the upstream slope where it is distributed by 2-yd. cars to the point of pouring.

Completion of the dam is scheduled for the year 1931 at which time an 18-mile conduit and the 60,000-kva. Tiger Creek power plant will also be completed. A. H. Markwart, vice-president in charge of engineering, Pacific Gas and Electric Company, is responsible for the major engineering features of the project. Construction work is under the direction of O. W. Peterson, engineer of general construction, with Hector Keesling as principal assistant. In the field, construction is in charge of P. I. Kurtz, resident superintendent, and R. D. Reeve, resident engineer.



SUPERVISING OPERATIONS (left to right): O. W. PETERSON, engineer of general construction; R. D. REEVE, resident engineer; HECTOR KEESLING, assistant engineer of general construction; and P. I. KURTZ, resident superintendent of construction.



PLACING REINFORCING BARS for concrete slab panel on derrick-placed rock. Each panel is concreted in one continuous pour. System of chutes and cars distributes concrete from plant at south abutment.

Contractor Keeps While Lowering Two



H. N. LENDALL (left), engineer in charge in the field, PAUL J. JONES, superintendent, and THOMAS J. McCARTHY, contractor's engineer.

TO keep a 400-ft. channel clear for navigation while lowering for 6½-ft. two 30-in. cast-iron submarine siphons 1,800 ft. long, across the Hackensack River, the Montrose Contracting Co., New York City, erected pile bents on the bottom of the river and suspended the 400-ft. channel sections of the pipes on threaded rods hung from the bents. Divers lowered the pipes by turning the bearing nuts on the rods. Between the channel and the two shores the contractor was able to lower the pipes by winches placed on bents extending above water level.

The two mains constitute the Hackensack River crossing of the Bayonne, N. J., water supply line, which carries an average flow of 13 m.g.d. Laid in 1919 with invert grade at El. —32, the pipes had to be depressed to El. —38.5 in 1929 to make way for deepening of the channel by the government. Flexible ball joints between the 8-ft. lengths of U. S. Pipe & Foundry Co. cast-iron pipe greatly simplified lowering operations. The joints allowed a deflection of 12 to 13 deg. without leaking. A maximum deflection of 8 deg. was required by the methods employed. Dis-

tance between the two mains was approximately 20 ft., c. to c.

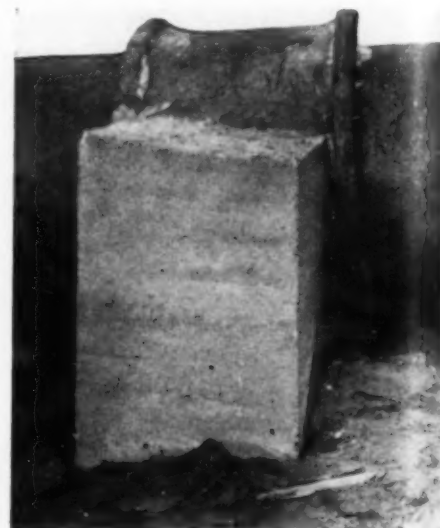
General Method—The contractor's method, in general, consisted in excavating a trench for one pipe with a hydraulic dredge and in lowering long lengths of this main as soon as sufficient dredging had been completed. The second main then was lowered as a separate operation. To provide for the reverse curve between portions of the line on the two levels, one 6½ ft. above the other, 192 ft. of pipe was lowered to varying depths to conform with the shape of the curve.

Trestle bents, both within and without the channel section, were spaced 24 ft. apart. In the channel, each bent, consisting of two piles and a cap, carried but one pipe. The trestle bents, or towers, outside the channel section, comprised four piles each and supported both mains during separate lowering operations. Caps of channel bents were placed close to the river bottom to insure that the tops of the threaded rods would be covered by at least 24 ft. of water.

Irregularities in line and grade of the two mains provided almost enough slack to allow the pipes to be lowered 6½ ft. without any addition to their lengths. The contractor, however, cut each line at the east bank before lowering it. Movement of the pipes made it necessary to close an 8-in. gap at each cut after the lowering had been completed.

Procedure—A 16-in. hydraulic dredge cleaned off the mud to the top of the pipes. The contractor then drove the piles of the trestle bents, and divers cut off the piles and com-

pleted the bents in the channel. Divers, following the pile driver, placed wire rope slings around the pipes at each bent. In the channel section, the slings were hung on the threaded rods; out-



SLEEVE EXTENSION at east bank increases length of pipe line 8 in.

side the channel, they were suspended by blocks and falls from the caps of the bents.

Starting at the east shore, the dredge excavated a trench under the south pipe to the west side of the channel. Workmen on the winches lowered the pipe from the shore to the channel at a uniform rate by turning the winches a fixed number of revolutions at each signal given by the man in charge of the operation. Three divers then lowered the 400-ft. channel section by turning the nuts on three adjoining



WINCHES ON PILE BENTS lower pipes from shore to channel. After lowering first pipe, winches are moved to other side of bent to lower second. Hydraulic dredge digs trench under pipes.

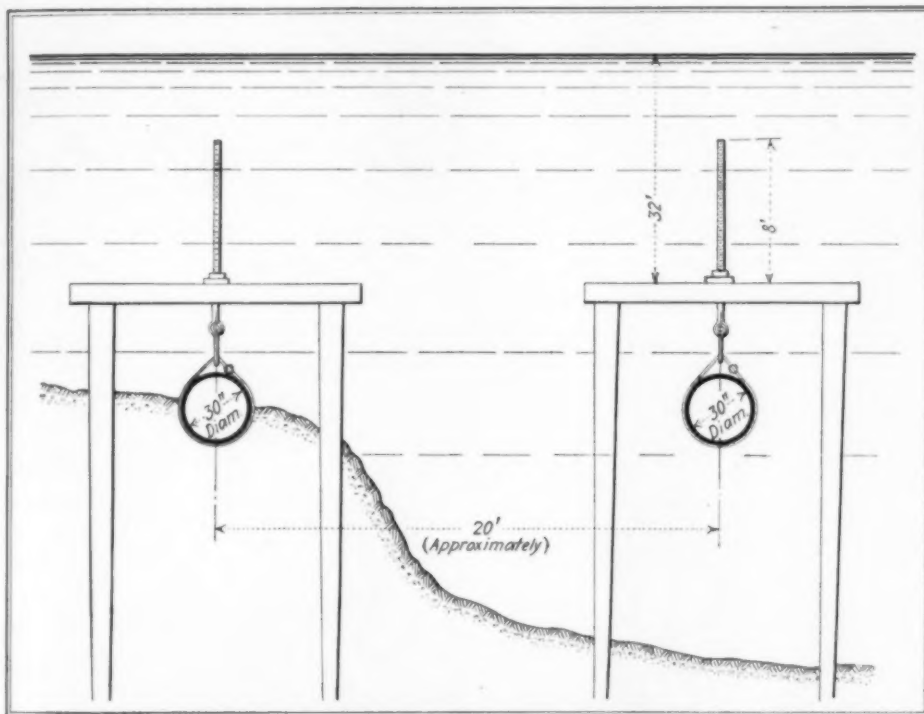
Channel Clear

Submarine Siphons

bents until the rods had been screwed down 6 in. With the pipe lowered 6 in. at three bents, the divers moved ahead to the next three bents to repeat the operation. This process was continued until the pipe had been lowered 6½ ft. The complete operation of lowering the channel section of one pipe required 12 hours' work on the part of the divers.

After excavating the trench for the

With the pipes in place at the new grade, tests were made and joints were calked, by divers using Chicago Pneumatic and Ingersoll-Rand air-operated calking tools, until the leakage was reduced to 2 cu.ft. per minute under a working pressure of 60 lb. After calking the joints and before making the second test under working pressure, the contractor applied a pressure of 150 lb. to the siphons.



THREADED RODS on submerged bents which carry pipes in channel are covered by at least 24 ft. of water. Divers turn nuts on rods to lower pipes. Dredge excavates trench for one pipe at a time.

south pipe to the west side of the channel, the dredge began, again at the east shore, to excavate for the north pipe. Dredging and lowering operations on this pipe were continued clear across the river to the west shore. The west end of the south pipe was the last portion of the two mains to be lowered.

While the east portions of the pipes were being lowered, the contractor built the towers of the west section. A total of 27 Dobbie winches was used to lower the pipe under the towers. These winches were moved from pipe to pipe, and from east section to west section, as the work progressed.



DIVERS construct bents in channel and lower channel sections of pipes.

After the pipes had been lowered, the piles of channel bents were cut off by divers using hand saws. Piles of the winch towers were pulled by the floating driver. Before pulling these piles, the hydraulic dredge backfilled the trench to prevent any disturbance to the pipes where they might be in contact with the piles.

Supervision—The work was under the jurisdiction of George E. Keenan, commissioner of finance of the City of Bayonne. Clyde Potts, consulting engineer, made the contract plans, and H. N. Lendall was engineer in charge in the field.

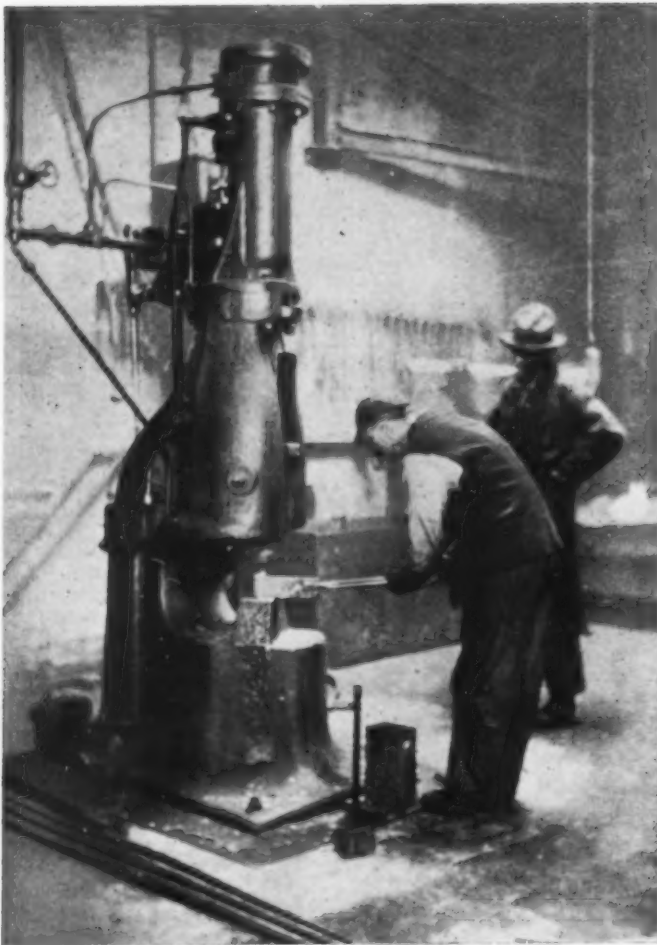
Paul J. Jones, superintendent, directed operations for the Montrose Contracting Co. The method applied to lowering the pipes was designed by William F. Jones. Thomas J. McCarthy was engineer in charge for the contractor.



TAKING SOUNDINGS to determine volume of excavation. H. N. LENDALL directs operations and takes notes.

State Highway Shops

THE Virginia Department of Highways operates approximately \$3,000,000 worth of equipment, including 2,185 major pieces, such as trucks, tractors, air compressors, and road machines. This equipment is issued to the eight districts of the state as needed. At each district headquarters, a shop and warehouse is maintained to service and repair equipment in the district. When equipment is worn to a point necessitating



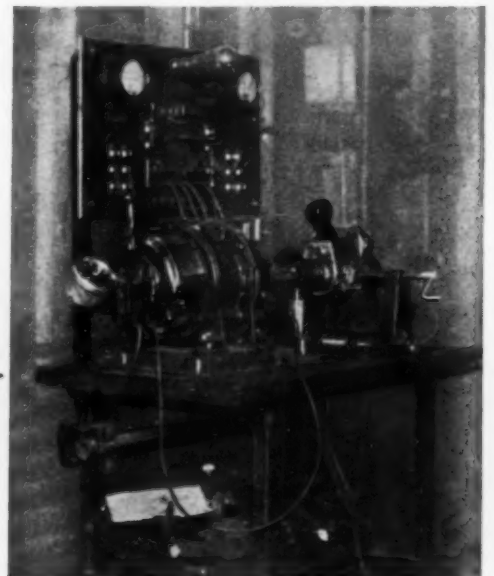
AIR FORGING HAMMER is important piece of blacksmith shop equipment. Other equipment includes electric and oxy-acetylene welding outfits, shears, heat testing furnace, and steel sharpener.



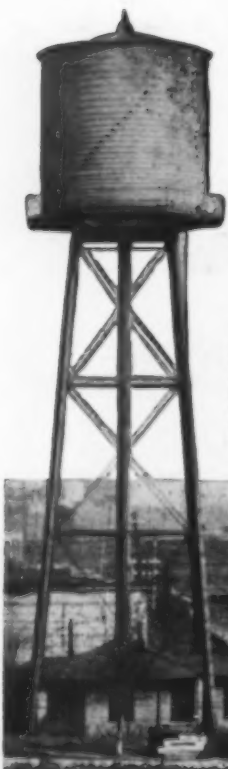
SHARPENING DRILL STEEL is another main function of blacksmith shop.



EQUIPMENT DEPOT (below), TRUCK REPAIR SHOP dismantles distributor for overhauling. Richmond, Va., does heavy overhauling of highway machines.

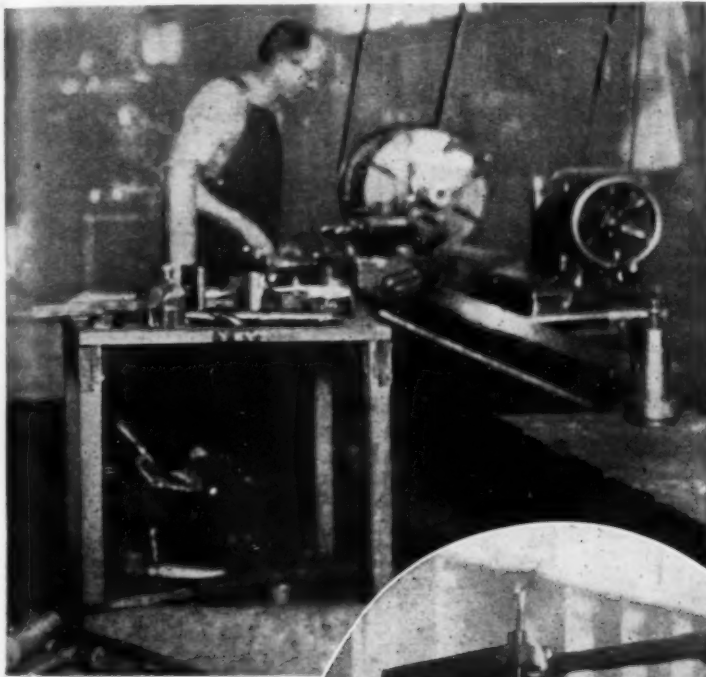


MAGNETOS are tested by this machine in electric shop.

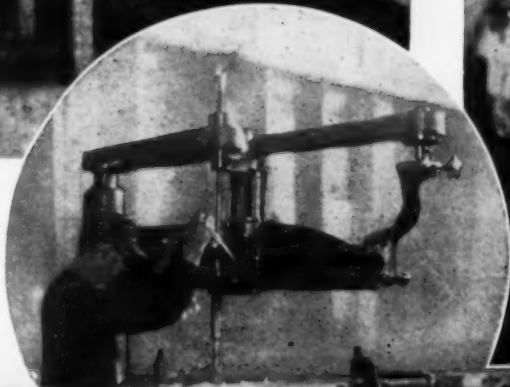


Rebuild Equipment

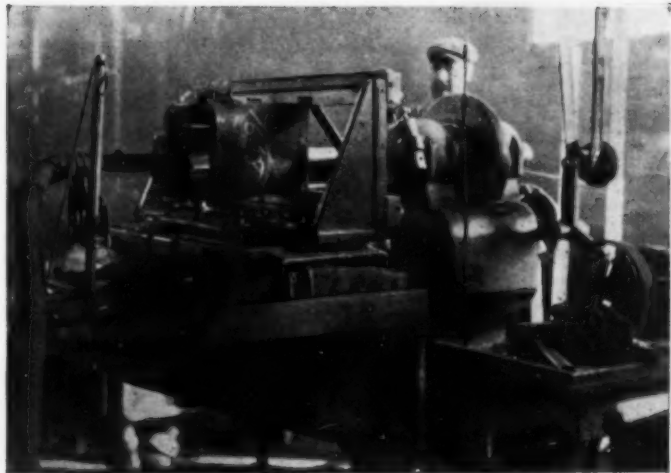
heavy repairs, it is returned to the equipment depot, Richmond, Va., where it is rebuilt under the general direction of C. W. Lambert, equipment engineer. The depot contains about four acres of floor space and employs over 120 workmen. A suggestion of its many functions is given by these three pages of photographs. The large warehouse and stockroom of the depot distribute supplies to the shops and districts. Henry G. Shirley is highway commissioner and C. S. Mullen is chief engineer.



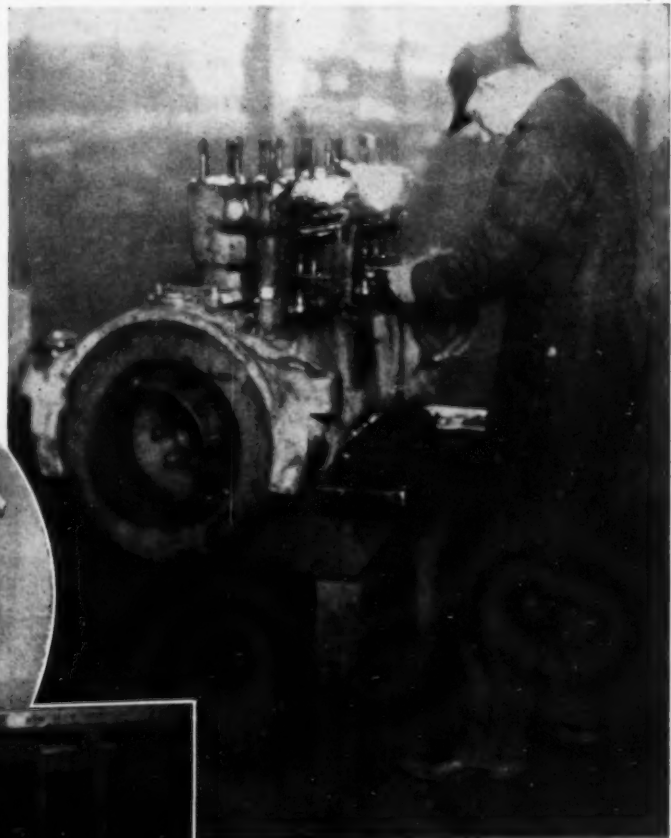
MACHINE SHOP has four lathes, in addition to boring mill and threading, milling and automatic gridley machines.



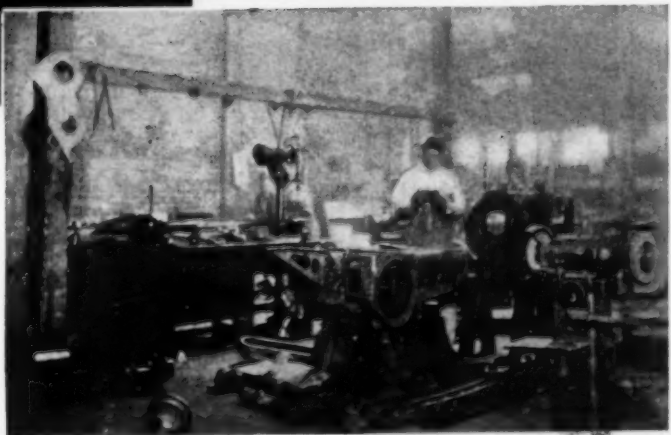
JIG, clamped to steel channel, expedites drilling of duplicate parts for truck frames.



CYLINDER GRINDER re-bores engine block. Machine shop also is equipped with crankshaft and piston grinders.

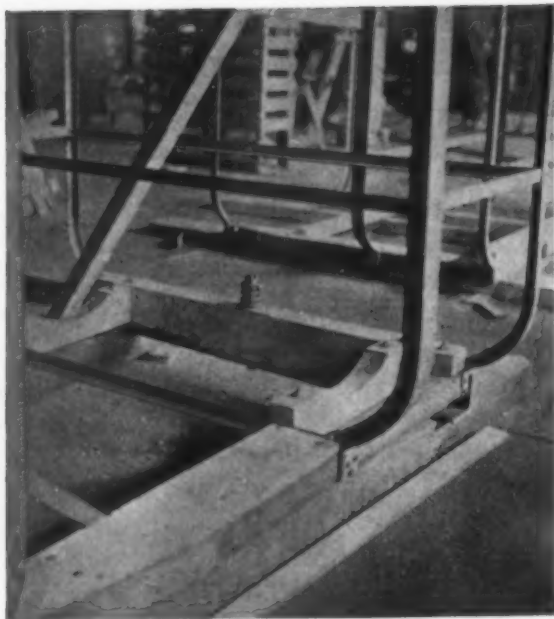


MECHANIC in motor shop repairs dismantled engine.



STRIPPED TO FRAME, tractor is rebuilt in repair shop.





Virginia Equipment Depot

(continued)

THREE-POINT SUPPORT (left) for cabs, as built in carpenters' and metal workers' shop, prolongs life of cabs by lessening stresses in frames.

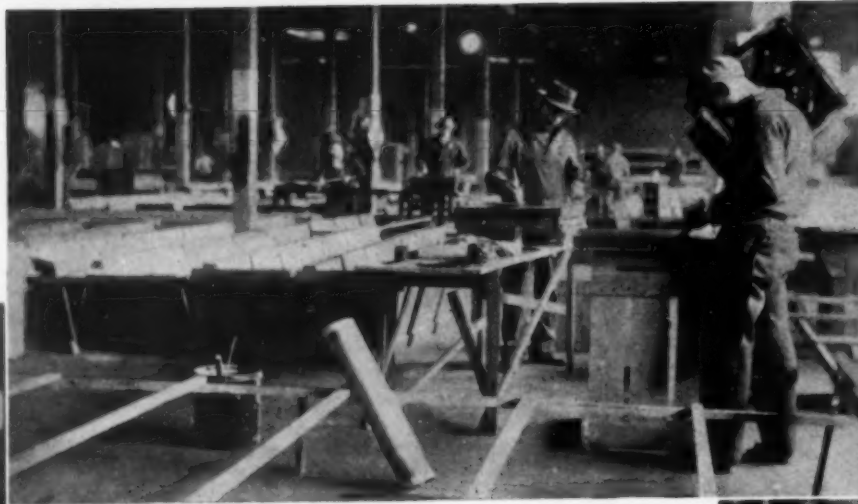
UPHOLSTERY SHOP (right) finishes cab roofs and makes cushions.



WAREHOUSE (above) contains large store of tools and supplies, bought in quantity and distributed to shops and districts.



ORDERLY STOCK ROOM (above) supplies repair parts and tools to entire state system of shops.



SIGN PAINTING SHOP turns out great numbers of highway markers.



STENCILS (left) for sign painting are cut in shop.

RAPID WORK (right) is possible by use of stencils.





UMBRELLA-LIKE STRUCTURE consists of timber trusses, reinforced with iron rods, radiating from cast-iron column to walls of building.

Wood Trusses and Cast-Iron Column Form

UMBRELLA ROOF

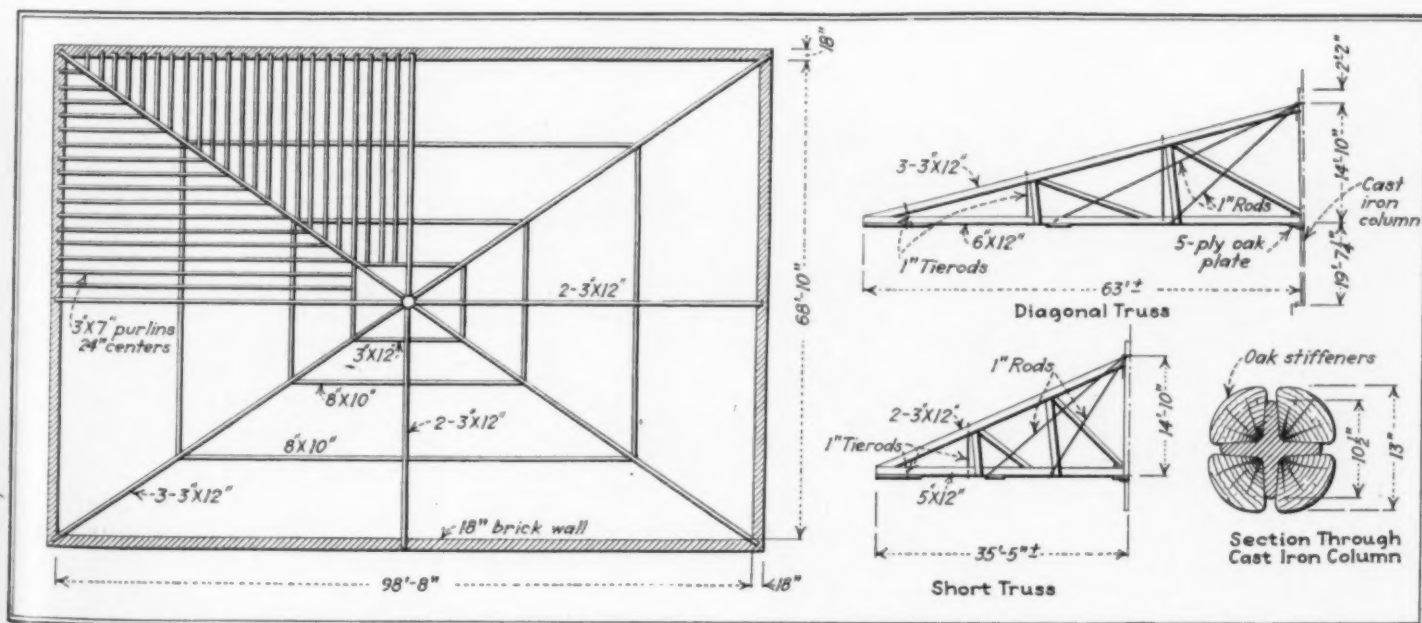
*Design Oddity Disclosed in Old-Time Building
Demolished at Roebling Plant*

UNIQUE in design and venerable in age, an unusual roof was disclosed by the demolition of the Broad St. wire mill to make way for the new rope shop extension at the Trenton, N. J., plant of John A. Roebling's Sons Co. Built before the days of the steel truss, the roof gave evidence of the ingenuity of the designer. One cast-iron column in the center of the building supported radial wood roof trusses, forming a structure umbrella-like in appearance.

Various estimates place the age of the building at from 65 to 75 years. The designer was faced with the problem of supporting a roof approximately 100x70 ft. in plan on the one column, in addition to the four building walls. From the unique design and the probable date of construction, it is assumed that the roof was the product of John A. Roebling's originality.

Eight wood trusses extended from the center column to the four corners and the four sides of the building. Iron rods from the center column reinforced these trusses. The rods were fastened by clevises to a ring around the column and were U-shaped, running around the bottom chords of the trusses. Top and bottom chords were connected with 1-in. tierods.

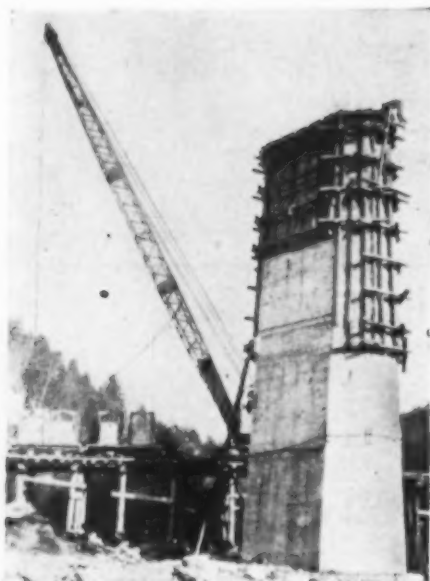
The column, itself of unusual design, consisted of a cast-iron post, shaped like an X in cross-section, with the angles between the legs of the X filled in by oak segments to give a circular appearance. Iron bands spaced about 3 ft. apart bound the oak fillers to the columns. Design of both column and trusses is illustrated by the accompanying photograph and drawings.



PLAN OF ROOF, elevations of trusses, and cross-section of column disclose ingenious construction developed by designer.

Railroad Construction

Modern Machines and of 28-Mile Link



CRANE, with 70-ft. boom, concretes tall piers by bottom-dump bucket from construction trestle.

By VINCENT B. SMITH
Assistant Editor,
Construction Methods

ROUGH topography and inaccessible location have presented great difficulties to the constructors of the 28.1-mile link of the Nicholas, Fayette & Greenbrier Railroad, between Swiss and Nallen, W. Va. Last month's *Construction Methods* described the project, with maps, and discussed construction operations from Swiss to Peter's Creek, 8½ miles up the Gauley River. At Peter's Creek, the railroad crosses the Gauley River and enters the Koontz Bend tunnel.

A trestle was built across the river at this point to aid the construction of the railroad bridge and tunnel. The

trestle bents rested on rock cribs. For stringers on the trestle, the contractor, A. Guthrie & Co., Inc., used 56-lb. rails from a dismantled logging railway. The trestle bents originally were spaced one or two to the rail length—15 or 30 ft. apart; the longer spans were used across the water. A quick rise on Oct. 2, 1929, took out the bridge, leaving only the cribs. In replacing the structure, the river spans were made 60 ft. long, with steel girder stringers.

Quarry and Crushing Plant—Because of the inaccessibility of the project, aggregates for concrete structures were crushed at the sites from

hard, local sandstone. A bluff of hard sandstone was available at the mouth of Peter's Creek, on the side of the river opposite the tunnel portal. Several acres of level ground between the bluff and the creek and river afforded space for a combination crushing and concrete mixing plant to serve both bridge and tunnel. The contractor installed a Pioneer Gravel Manufacturing Co.'s crushing plant and a Rex 14-cu.ft. mixer.



DRILLERS start hole in heading at south portal, Koontz Bend tunnel, with water-liner drifter drill mounted on column.



CRUSHING AND MIXING PLANT at Peter's Creek takes blasted sandstone from adjacent quarry, prepares fine and coarse aggregate, and mixes concrete for river bridge piers and Koontz Bend tunnel lining.

The capacity of the crushing plant is about 200 yd. in 10 hours. One Waukesha motor drives the primary Universal 12x36-in. jaw crusher and a belt conveyor; a second Waukesha motor operates a 36-in. jaw sand crusher, an elevator, and the shaker screen.

A single quarry blast provided all the material necessary for the 6,300 yd. of concrete in the bridge piers. This quantity of rock was blasted by the coyote-hole method. The method consists in driving horizontal one- and two-man drifts at grade to the cut line. Tee laterals usually are driven at right angles at the end of the drifts, and short crosscuts are opened off the drift at intervals as needed. For the quarry blast, two coyote holes, 45 ft. long, were drifted into the hillside, and tees were driven at the end of each drift.

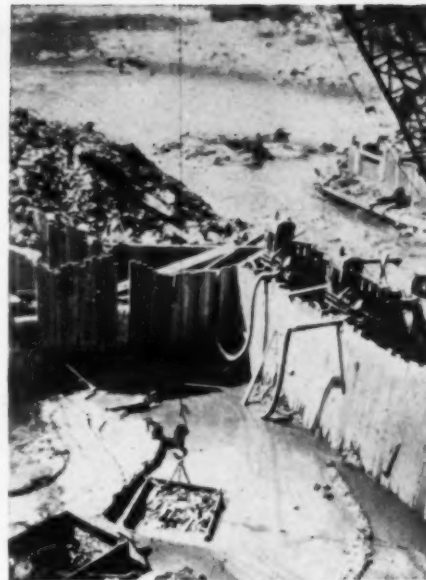
in Mountain Country-II

Methods Speed Building in West Virginia

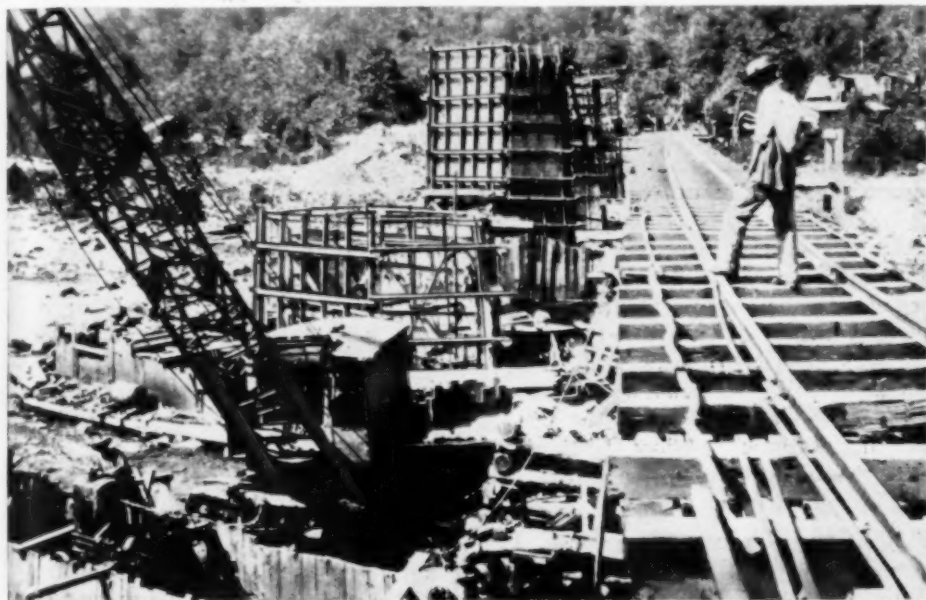
with each leg 20 ft. long. The holes were loaded with 8,000 lb. of black powder, which broke 8,000 yd. of rock.

Distribution of Concrete—Concrete for the bridge piers was transported in 1-yd. bottom-dump buckets, hauled on two-car trains by a 12-ton Whitcomb gasoline locomotive, with two buckets on each car. Two trains were kept in operation, one being loaded while the other discharged concrete at the bridge.

The footings of piers 7 and 8 were protected by rockcrib cofferdams. Along the inside of the cribs the contractor drove 3-in. wood tongue-and-groove sheeting and calked the leaks before placing the clay fill. The footings of piers 6 and 8 rest on solid rock, and the cofferdams of these piers were pumped out to allow the footing forms to be placed and the concrete to be poured. Pier 7, however, rests on a boulder formation, and it was impossible to pump this cofferdam dry. A concrete seal, therefore, was placed under water, covering the full area of the cofferdam and making virtually a spread footing.



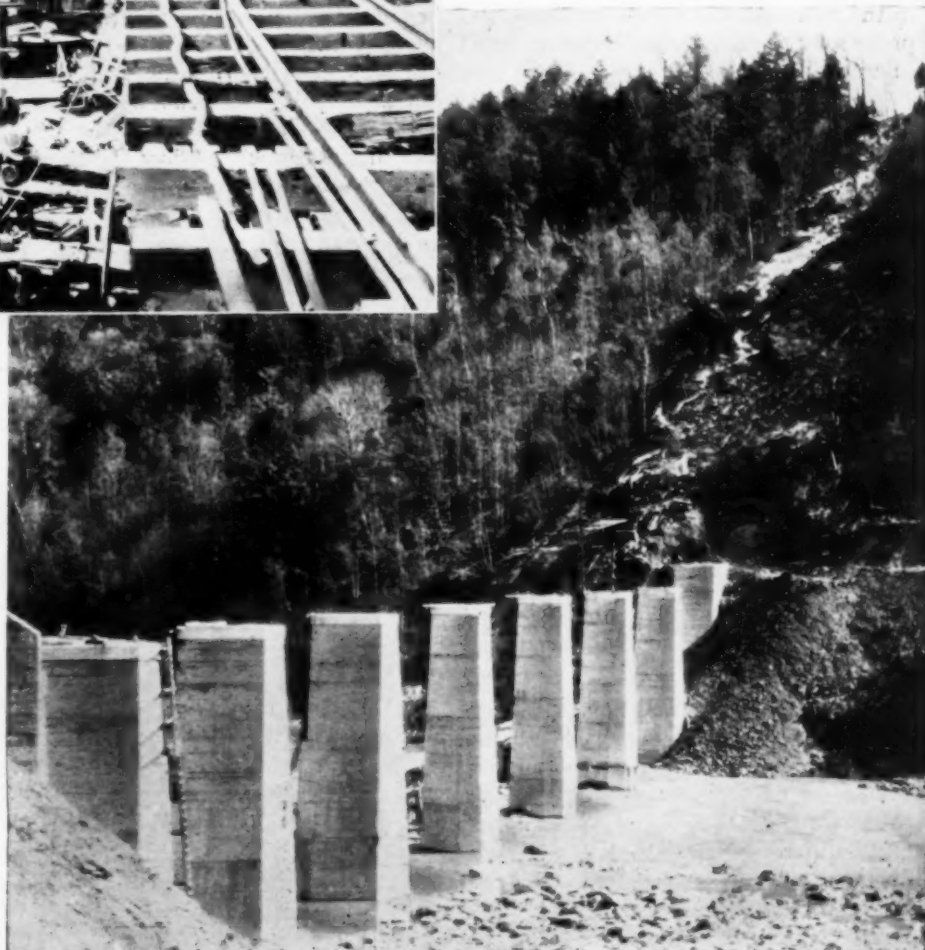
COFFERDAM and pumps lower water level at pier 8 while contractor excavates to rock.



EXCAVATION AND CONCRETING of footings were completed by crane, working on river bottom, before it moved on to trestle to build piers.

Aggregate bins, batchers and mixers were elevated to allow the installation of a concrete hopper in the gravity system from the mixer to the buckets on the flat cars. As the plant operated efficiently without the hopper, it never was installed.

Construction of Bridge Piers—The eight piers of the bridge are about 70 ft. high above low water. Footings of piers 1 to 5, at the north end of the bridge, were constructed without cofferdams. Pier 1 rests on gravel hardpan, and piers 2 to 5, on rock foundations 10 to 15 ft. below low water. Piers 6 and 7 were kept dry by means of cofferdams and pumps while the footings were poured. A sandbag cofferdam sufficed for pier 6.



READY FOR STEEL. Eight piers of bridge are 70 ft. high above low water. At far end is north portal of Koontz Bend Tunnel, with top heading opened. Construction trestle is on other side of piers.



TIMBERING HEADING, north portal, Koontz Bend tunnel. Wood packing is used back of lagging.

concrete from this structure. Part of the excavating was carried on with clamshell bucket, but most of it was done by hand, the crane removing the spoil in skips.

All concrete was placed by bottom-dump buckets. The last concrete was poured just before Christmas. For the few days of cold-weather concreting, aggregates were heated with steam pipes in the bins, hot water was used in the mix, and the fresh concrete was protected with canvas housing and salamanders.

Bridge Steel Contractor—Direct contract for the fabrication and erection of steel on the Gauley River bridge is held by the Mt. Vernon Bridge Company, Mt. Vernon, Ohio. The same company fabricated the smaller girders which are to be erected by the general contractor.

Tunnel No. 1—The Koontz Bend Tunnel, 3,200 ft. in length, is on a tangent which rises at a grade of .83 per cent from the Gauley River bridge to the south portal. It was driven through a laminated rock formation varying from sandy shale to blue slate, with a material resembling carbon, graphitic in action, between the thin layers of rock. The character of the rock required the driving of a top heading and timbering close behind the working face.

Compressor plant, shops, timber framing yard, and camp were placed on the north side of the river. Air for tunnel drilling and mucking operations was supplied by two Sullivan angle-compound compressors, each furnishing 1,150 cu.ft. of free air per minute at a pressure of 110 lb. A direct-connected Fairbanks-Morse 200-hp. diesel engine drove each compressor. Air was carried across the river by a 4-in. pipe line to a receiver

at the north portal. Another 4-in. line across the mountain supplied air to the south portal. Both of the 4-in. lines were equipped with Dayton couplings. From the receiver at the north portal, a 3-in. screw-pipe line was carried a short distance into the tunnel to a reducing valve from which two 2-in. lines, one for drills and one for the mucking machine, were laid to a point near the face.

Top headings were driven from both ends of the tunnel. The north heading was driven from the face of the portal. At the south end, an adit about 75 ft. long was drifted into the center line of the tunnel to allow the heading to be driven previous to the excavation of the approach cut.

Drilling—The contractor used Ingersoll-Rand S-70 water-liner drifter drills on column mountings in both headings. In the south heading, excavation was carried to base-of-wall-plate grade; but, in the north heading, to provide space for operation of a

power-drag-scraper mucking machine, the grade of the heading was carried 2 ft. below the base of the wall plate. Four drills were operated in the north heading; two, in the smaller south heading.

From 38 to 52 holes were drilled per round and were shot with delay exploders. Both V cuts and diamond cuts were tried in different portions of the tunnel. Superior results obtained with the diamond cut led the contractor to standardize for the most part on this method.

Timbering—Bad roof made it necessary to timber close to the working face. Rings of 12x12-in. timbers in both headings at first were set on 6-ft. centers. This spacing soon was reduced to 4, 3, and 2 ft. because of weight's developing in the roof. Rock in the south heading was particularly bad, pressure at several points causing crushing of the timber in the sections on which 4-ft. and 6-ft. spacing was used. The heading advanced under sliding crown bars until a set of 20-ft. wall plates could be placed, and arch segments and lagging installed. In the north heading, where rock conditions were better and where the drag-scraper mucking machine was employed, it was possible to place one or two sets of 20-ft. wall plates and to muck out the rock before placing the arch segments. Voids behind the 4-in. lagging were filled with hand-placed wood blocks driven home.

Mucking—In the north heading, Carl Nelson, tunnel superintendent, excavated the broken rock and loaded 1-yd. cars with a drag-scraper mucking machine shown, in part, in one of the photographs. The machine consisted of an elevated platform carrying a 20-hp. air-driven Clyde hoist, which operated a bottomless scraper bucket on a continuous cable reeved through a pulley block hooked to an eye-bolt



MUCKING MACHINE for north heading under construction. Air-driven hoist, to be mounted on platform, pulls bottomless, drag-scraper bucket up incline on to grizzly, through which muck drops into car on narrow-gage track beneath.

set in the heading wall. The machine was mounted on flanged wheels running on rails which cleared the narrow-gage track and permitted cars to be run under the platform. The bottomless bucket carried the broken rock up an incline at the front of the machine on to the platform, where the rock dropped through a grizzly into the car beneath.

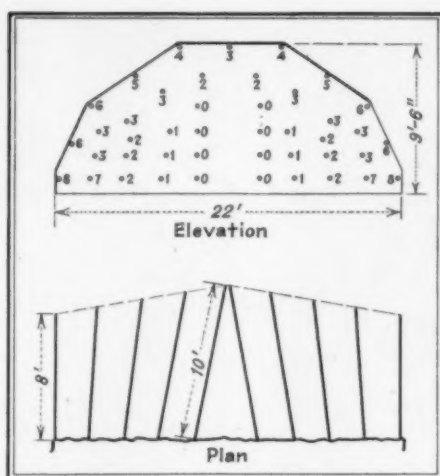
In the south heading, W. J. Lewis, superintendent, used 1-yd. roll-over concrete dump cars to haul the muck, which was loaded by hand. Horses and mules pulled the muck cars in both headings.

Ventilation — The comparatively short lengths of tube necessary to ventilate the headings were made up of sections of 20-in. riveted 20-gage steel pipe. Joints were wrapped with a 2-in. strip of burlap and were sealed with an application of tar. A Sturtevant No. 7 fan forced air into the tube at one portal; an American Blower No. 7 fan functioned at the other end of the tunnel.

Excavating Bench—After the north heading had been driven about 1,800 ft., the headings being then about 250 ft. apart, the contractor ceased work on the north heading and started excavation of the bench at the north portal. All bench muck was removed from this end. The bench was pulled in 12-ft. rounds, shot to grade with three rows of vertical holes and two rows of lifters. A Marion 41 air-operated steam shovel, reconstructed on crawler mounting and equipped with a 1½-yd. special rock bucket, loaded 4-yd. cars, which were handled

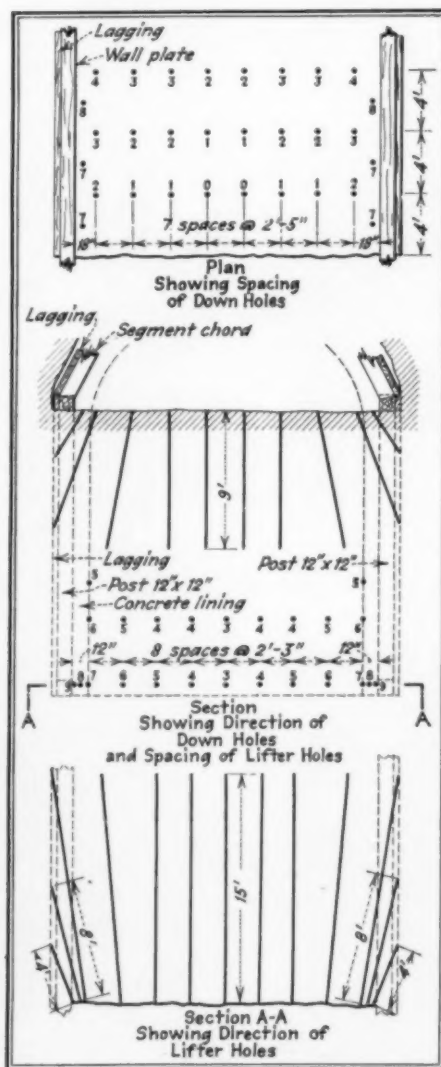


NORTH PORTAL, Koontz Bend tunnel. Bench has been faced close to heading timbers.



HEADING—Diagram used by Carl Nelson in drilling and loading bore holes. Figure at each hole denotes number of electric delay blasting cap employed in loading. Figure 0 indicates that hole is shot direct.

in six-car trains by two 20-ton Vulcan gasoline locomotives. An air-operated transfer hoist on the rear of the shovel lifted empty cars from the dead-end



BENCH—Carl Nelson's diagram for pulling 12-ft. round, using three rows of down holes and two rows of lifters. Figure at hole indicates number of delay blasting cap.



UNDER PRESSURE. Heading timbers take weight near south portal.

track behind the shovel to the track alongside for loading. This shovel was one of the group of five tunnel excavators which A. Guthrie & Co., Inc., was the first to place on crawler mountings. Muck from heading and bench was wasted in a dump along the river outside the north portal.

The headings met March 14. By April 25, the bench was in more than 1,000 ft. and was being removed at the rate of 24 ft. a day under the attack of two 10-hour shifts which virtually amounted to two 12-hour shifts. The entire tunnel is being lined with an 18-in. minimum thickness of concrete.

G. A. Rosenbaum Sub-Contract Section—To move the 65,000 yd. of material on his 1-mile section, G. A. Rosenbaum took a ¾-yd. Erie steam shovel from the Saturday road down a 35-deg. slope to the grade by snubbing it around trees along the route. Approximately 50 per cent of the excavation is cast, and the rest is hauled a short distance. Two 2-yd. Iron Mules and two 2-yd. trucks take care of most of the hauling. On one fill across a culvert, a gravity run, with a narrow-gage dump car on a hauling rope and gasoline hoist return, was used. The 20-ft. reinforced-concrete arch culvert, 36 ft. long, was built by sub-contract.

Piper & East Section—The two contracting firms from Princeton, W. Va., which took the sub-contract to grade the 7 miles from Mile Post 10 to Mile Post 17, divided this portion into two sections. One partnership, Piper & East, took the north section, 3¼ miles long; and the second partnership, Brown, Murphy & Wright, took the south section, 3¼ miles in length.

Excavation on Piper & East section



CRAWLER TRAILER builds fill on Piper & East section. Short hauls make trucks and tractor outfits economical on this part of line.

amounted to approximately 293,000 cu.yd., 50 per cent of which was solid rock. Only 2,000 ft. of the 3½ miles was through cut, the rest being side-hill cut on slopes varying from sheer cliffs to 60 deg. About 50 per cent of the sidehill excavation was cast. Hauls for the other material averaged 800 ft., with maximum hauls over 3,000 ft. in length. The job was adapted to truck and tractor hauling, as the hauls were comparatively short and as the presence of cliffs along the line would have made it difficult to cut a grade for narrow-gage track to be laid alongside the shovel.

Piper & East had a 1½-yd. Bucyrus-Erie steam shovel and a 1-yd. Erie steam shovel to handle excavation. To haul the spoil, they used an Athey 5-yd. crawler wagon, pulled by a Caterpillar 30 tractor, three Indiana 2½-ton trucks, one Schacht 2-ton, and one International 2½-ton, of their own, and rented one G. M. C. 3-ton, two Relay 3-ton (with floating rear axle), and two Corbett 2-ton. All equipment traveled from the hard-surface highway over 10 miles of bad county road to the edge of the canyon, whence it descended on a 30 per cent grade to the line. The shovels moved in under their own power.

On the deep sidehill rock cuts of this section, it was the practice of the contractors to put down holes with a 5-in. steam well drill, 2 ft. behind the ditch line, to a couple of feet below grade. At one of these cuts, which is 121 ft. high to top of slope, eight holes were drilled to depths of 40 to 60 ft. and were sprung with three or four cases of dynamite apiece. The holes then were loaded with black powder and with Union 40-per cent gelatin dynamite, only one type of explosive being used in each hole and the charges being arranged to waste or save the

rock as needed when the holes were fired simultaneously. Six of the holes in this set were shot ahead of the other two to provide spoil for the shovels.



CRAWLER - MOUNTED SHOVELS travel rough country to remote locations.

This first shot moved 32,000 of the 52,000 yd. in the cut.

To move the remaining 20,000 yd. in this vertical sidehill cut, one of the two holes was loaded with 130 cans of black powder, and the other, with 75 cases of 40 per cent gelatin dynamite.

Another example of typical blasting methods on this section was in a cut for a double-track portion of the line. This cut contained 20,000 cu.yd. of solid sandstone. Eleven holes, 30 to 40 ft. deep, were drilled in two rows. One row was loaded with 300 cans of black powder, and the other, with 100 cases of dynamite. The holes were wired to be fired simultaneously.

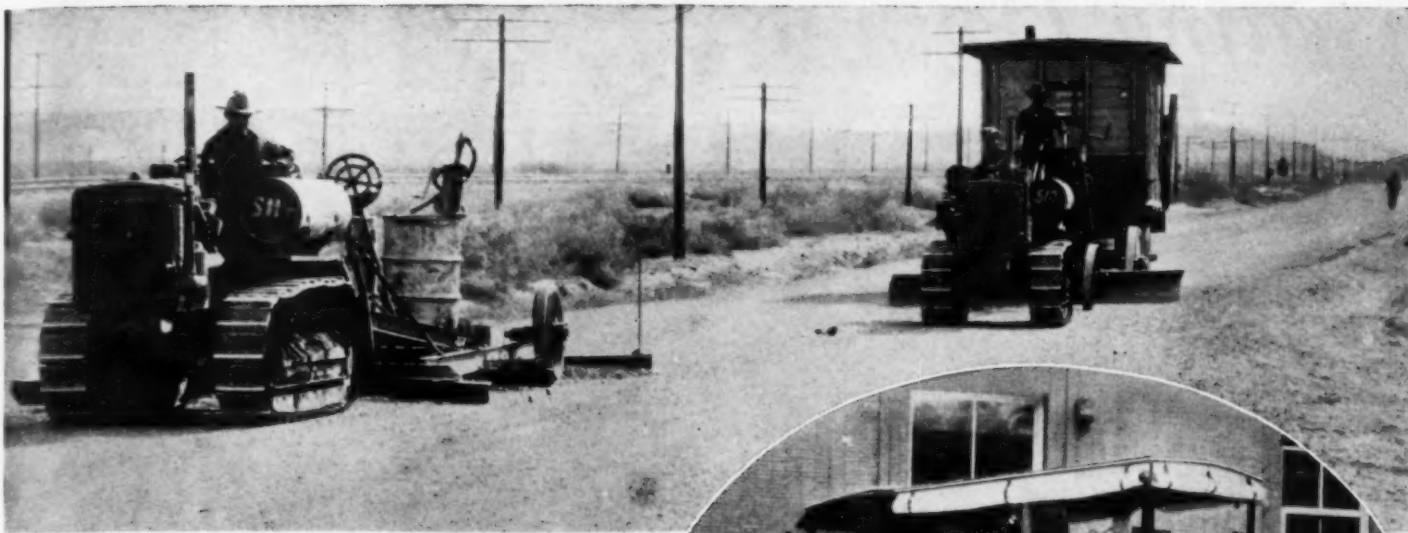
During the month of August, while they were working in heavy cuts, Piper & East's two shovels moved 41,000 yd. of excavation. For the lighter drilling, the contractor had three Ingersoll-Rand portable compressors. To build two arch culverts, one a 10-ft. arch, 105 ft. long and the other a 14-ft. arch, 60 ft. long, containing a total of 1,100 yd. of concrete, a Holland crusher provided the aggregate and a Jaeger 7-cu.ft. gasoline mixer produced the concrete. Novo pumps were used principally to keep the culvert excavations dry and to supply water to the shovels.

Crawler Excavators—Some of the heaviest grading on the line is contained between Mile Posts 10 and 18, marking the extent of Residency 2. In Mile 14, excavation totals 168,000 yd. It is the opinion of Mr. Hammond, resident engineer in charge of this work, that without crawler shovels it would have been impossible to import and operate equipment to grade his section. An observer of conditions on his residency can readily agree with him. The shovels moved under their own power over miles of almost impassable roads, down steep canyon slopes, and through forests and thick undergrowth.

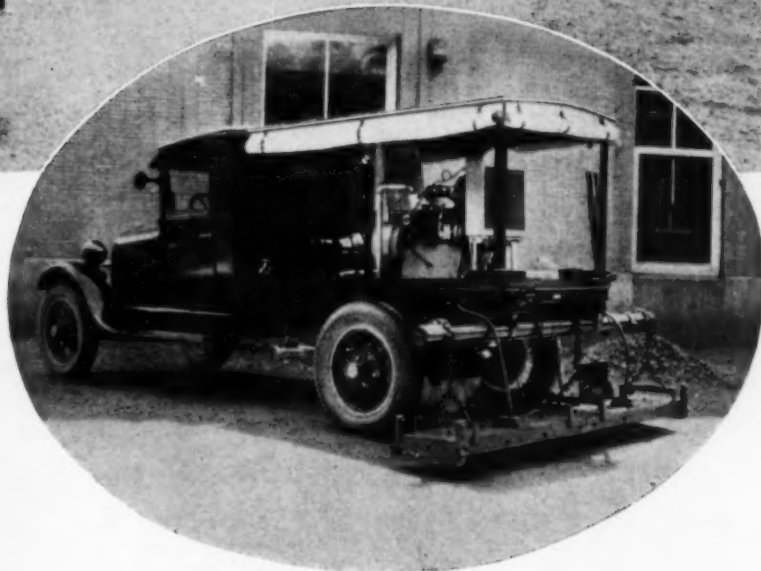
[NEXT MONTH: The third installment of this series will continue the description of tunnel construction and heavy grading.]



CAMP of Piper & East organization on plateau above Meadow River canyon.



TANDEM MAINTAINERS, ordinarily operated several hundred feet apart in order not to interfere with traffic, cover entire roadway in one trip. Loose material is carried from one side of the road to the other, thus eliminating the hazard to motorists of a center ridge of loose earth and debris. Camp house on rear outfit provides living quarters for operator.

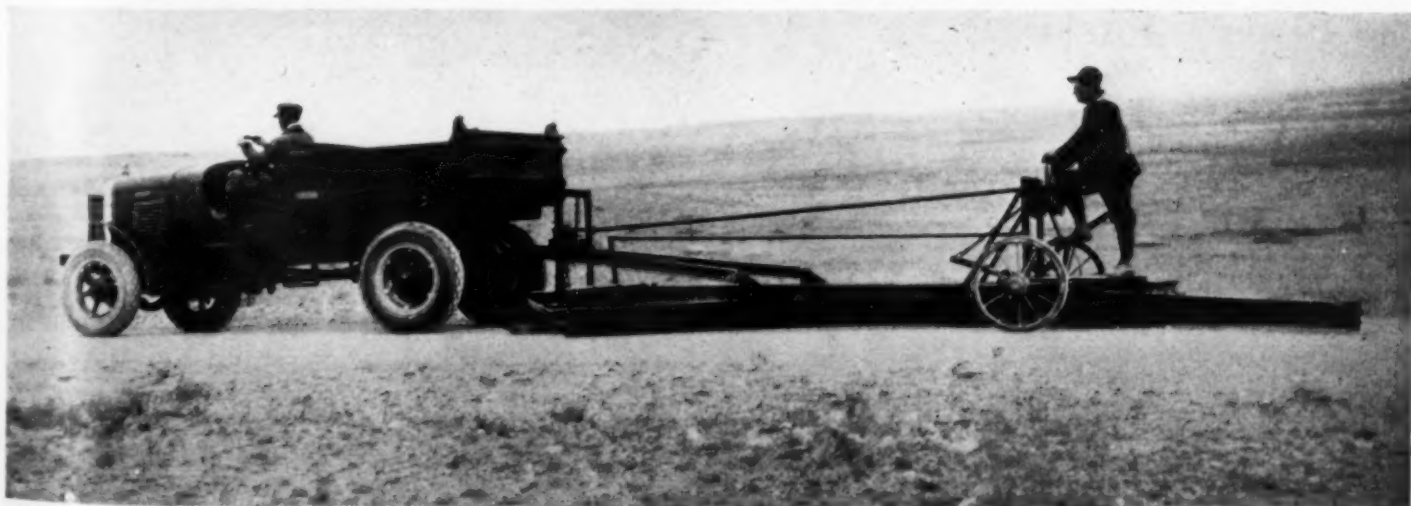


NAIL PICKER, designed and built in New Mexico for local highways, consists of electric generator mounted on light truck and connected with powerful magnet at rear of machine which clears roads of nails, screws, bolts, and other tire-puncturing nuisances. Four of these machines removed 131,194 lb. of scrap material from the roads last year, the average weight of metal being 4½ lb. per mile.

Details of MAINTENANCE *in New Mexico*

By R. W. BENNETT

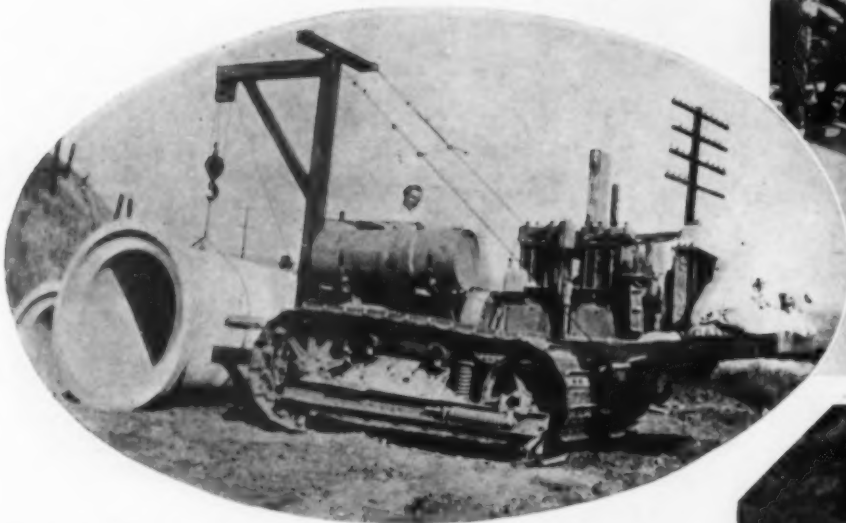
*Office Engineer,
New Mexico Highway Dept.*



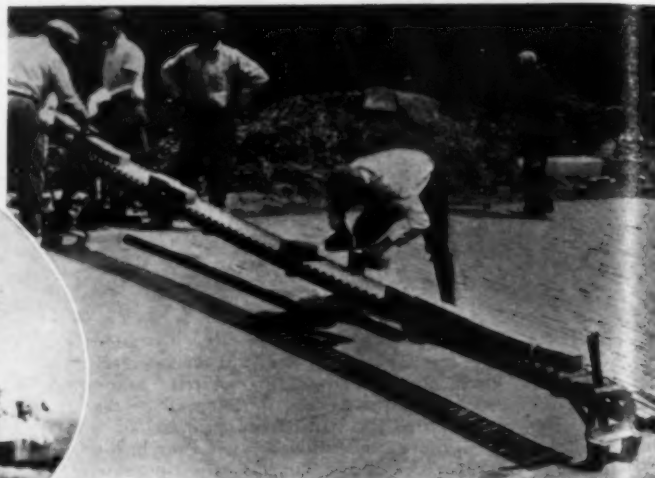
HIGH SPEED MAINTAINER, also a local product, weighs less than ordinary road drag and can be operated at a speed of 8 to 12 miles per hour on gravel or earth roads. Vibration is reduced to a minimum by the use of three parallel stabilizer blades, two of which are placed in the front and one in the rear of the machine. These blades can be adjusted by the operator to stop vibration any time it occurs. Maintainer can be pulled by comparatively light truck.

Getting Down to DETAILS

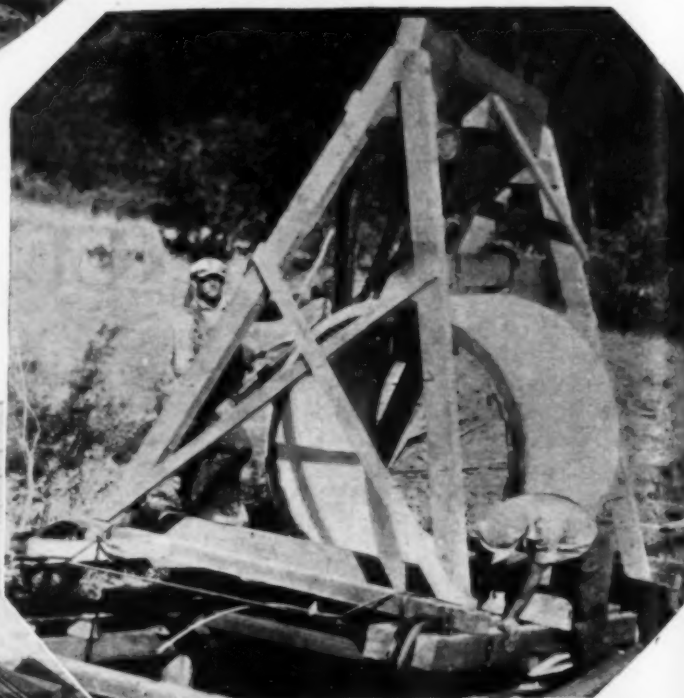
Close-up Shots
of Job
Methods and
Equipment



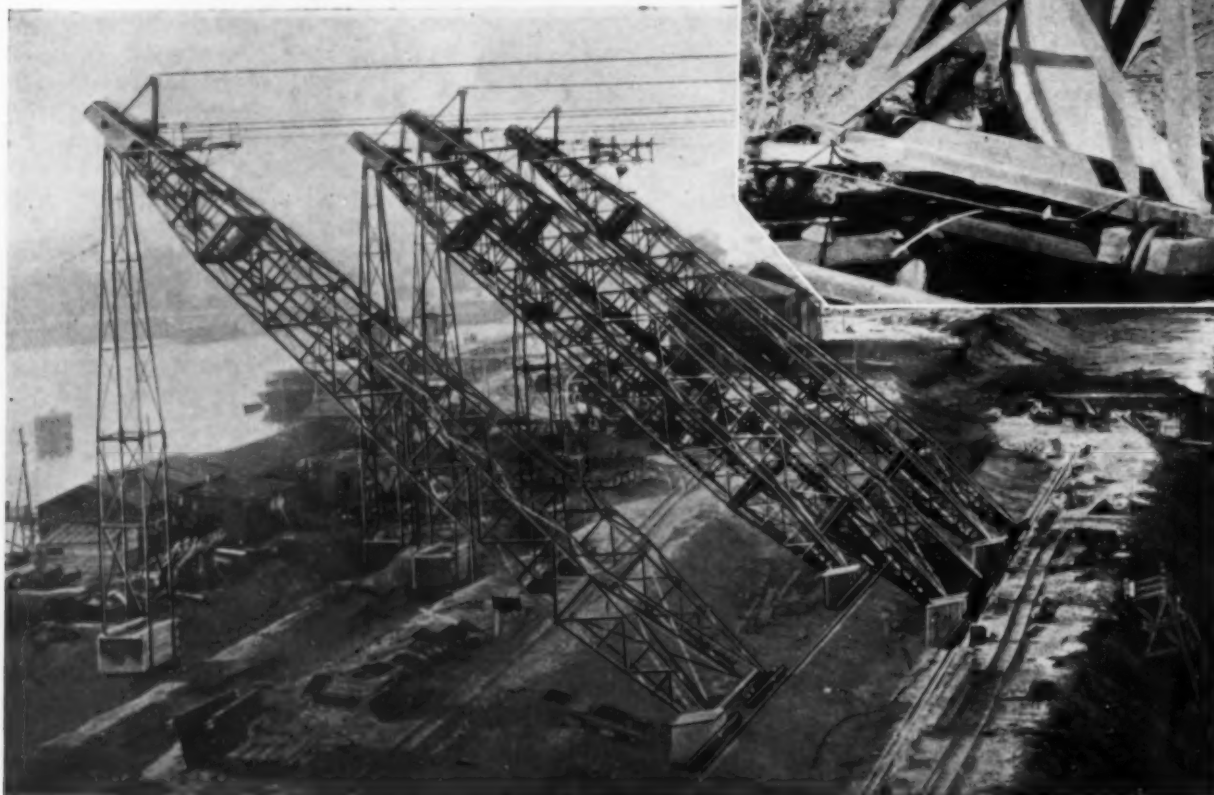
BOOM (above) on rear of Caterpillar tractor handles concrete pipe for R. G. Le Tourneau on approach to Southern Pacific's Suisun Bay bridge in California. Grading work was described in *Construction Methods*, Feb., 1930, p. 50.



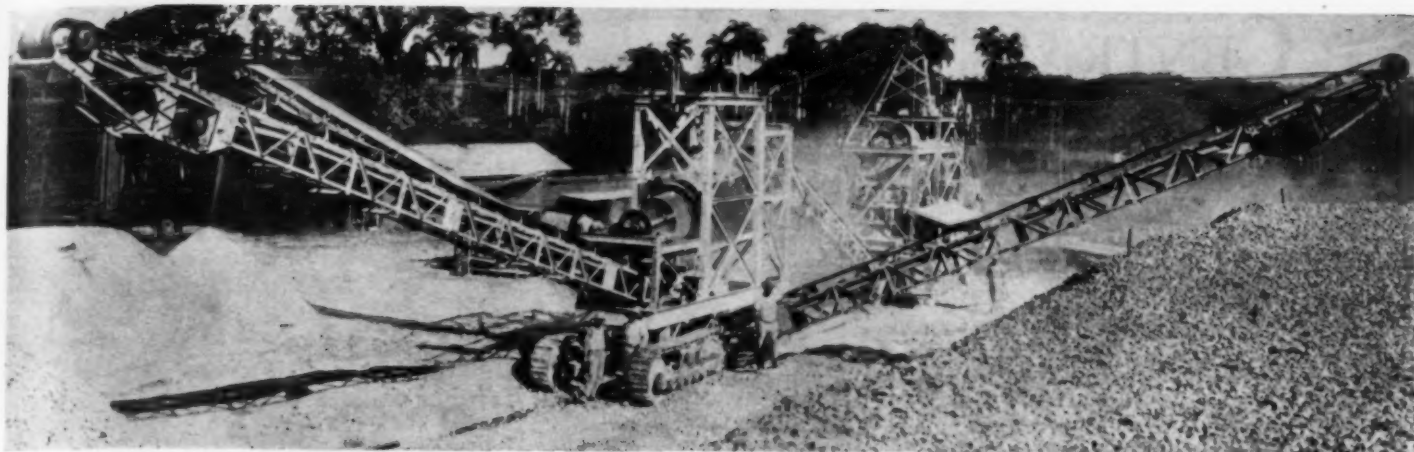
ROLLER CONVEYOR (above, right) carries brick to dropper. Studies of U. S. Bureau of Public Roads indicate that dropper can lay 5,700 bricks per hour, exclusive of all delays.



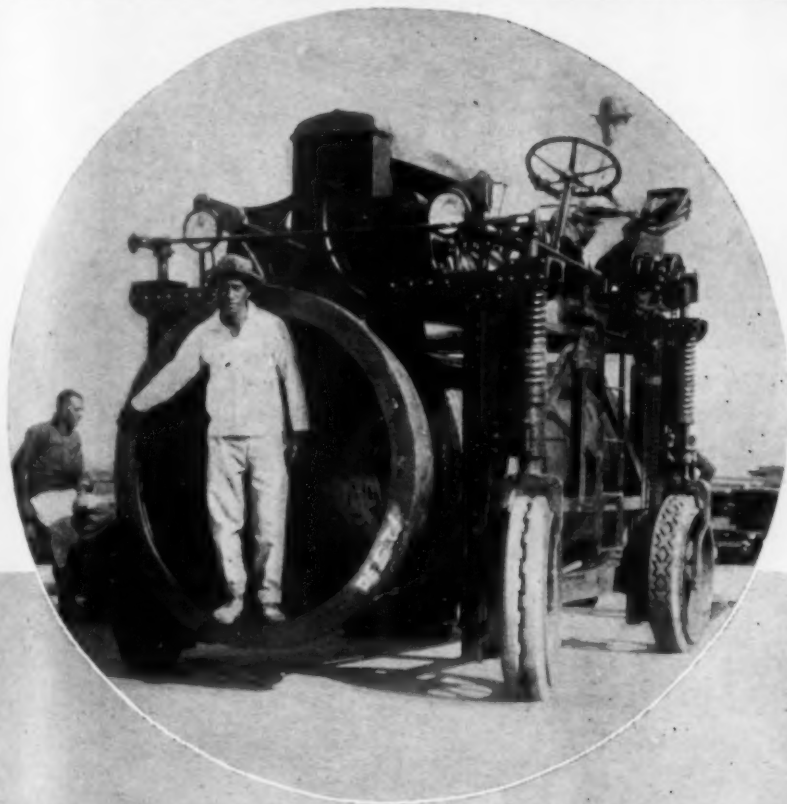
TRACK-MOUNTED CARRIAGE (above) lays 60-in. Lock-Joint pipe for Tanpum Creek siphon on Bureau of Reclamation's Yakima project.



WEIGHTED, OSCILLATING AND ROLLING TOWERS, built by Etablissements Gaston Jeannin, Bayonne, France, act as automatic tension compensators on rope tramways used in construction of 1,315-ft. lock, at IJmuiden, on Holland canal from Amsterdam to North Sea.

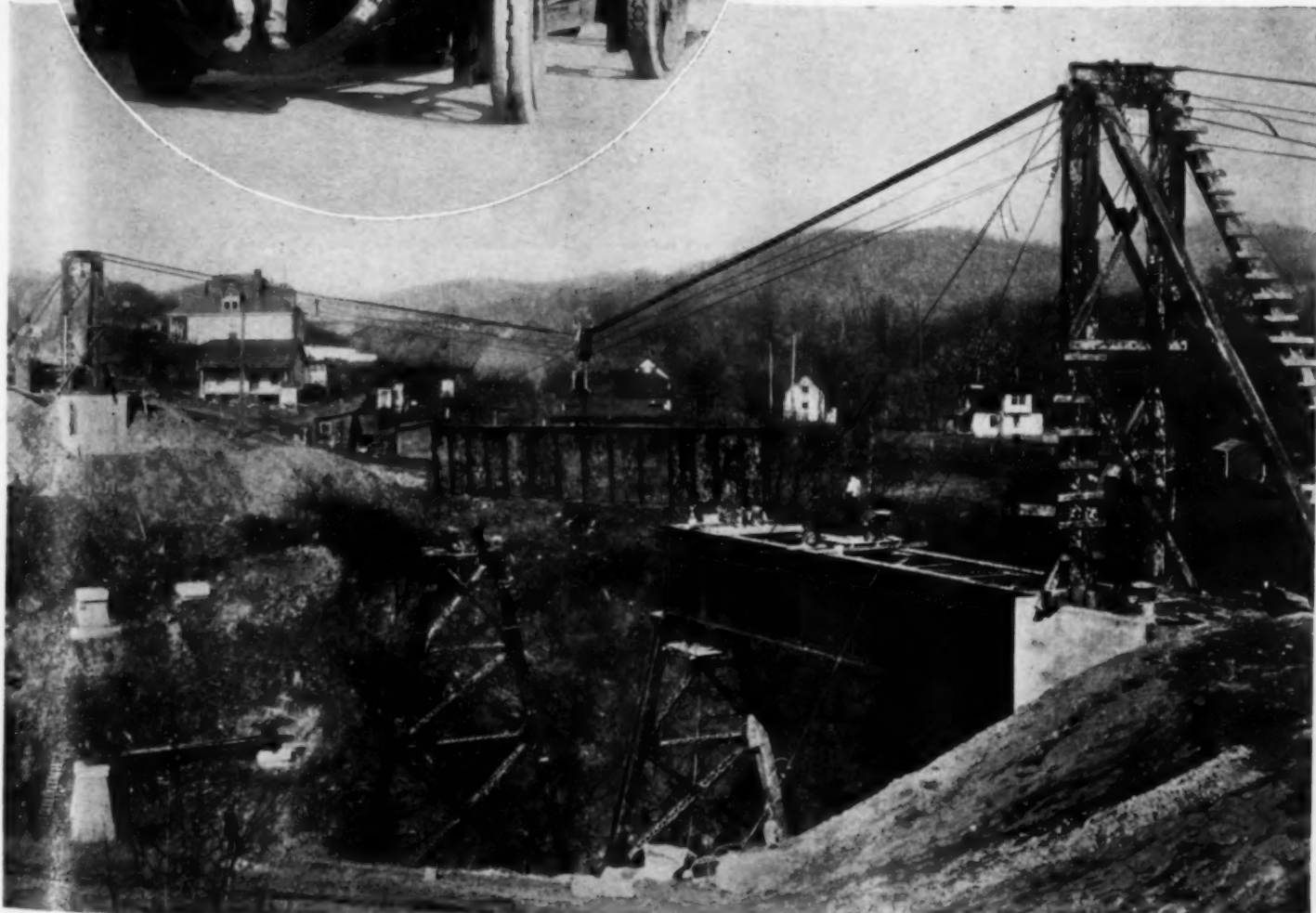


ROCK CRUSHING PLANT prepares material for Cuban highways. Mobile Bodinson outfit is equipped with belt-conveyor outriggers for stockpiling. Horse-drawn carts feed primary crusher in background.



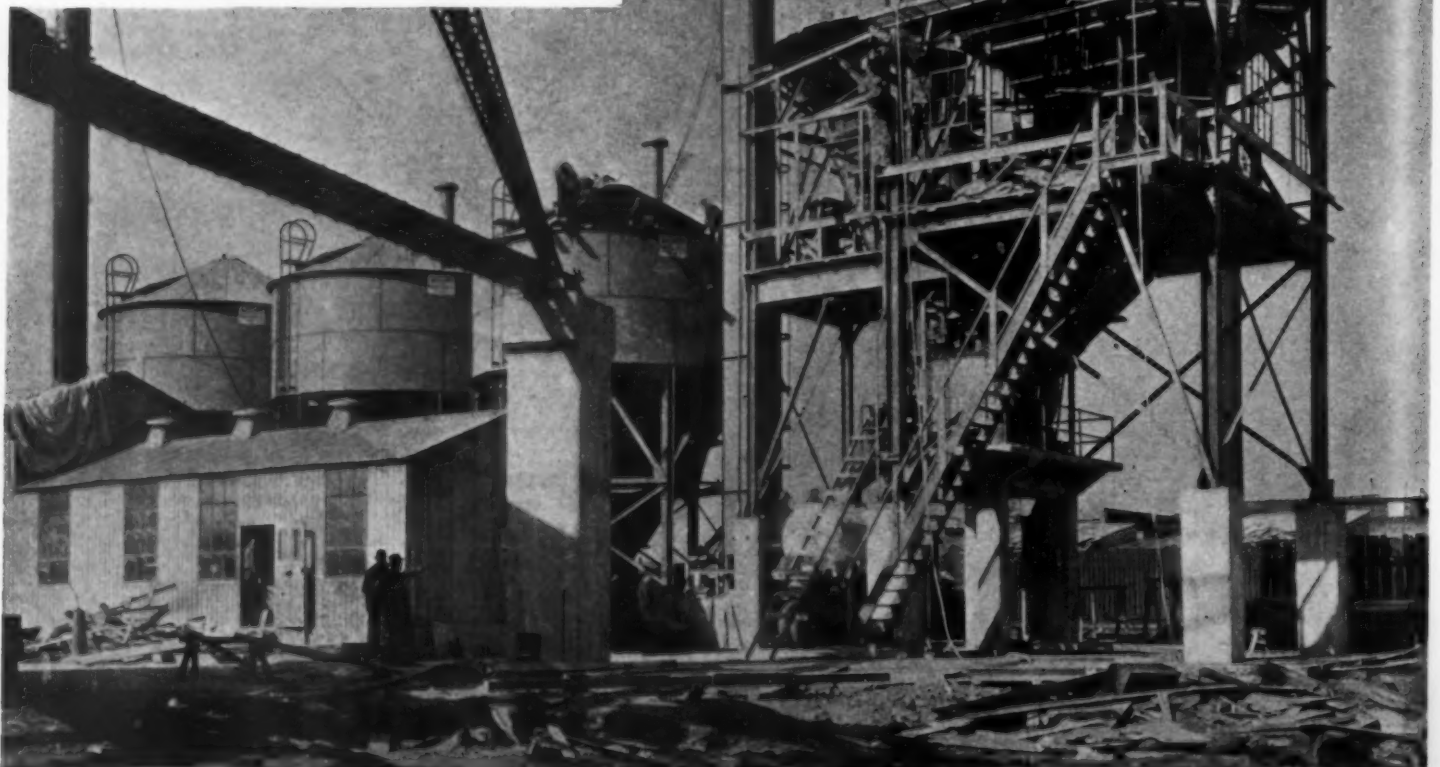
PIPE CARRIER (left) of Dallas Machine & Locomotive Works, Inc., Dallas, Ore., lifts and hauls 6½-ton, 14-ft. sections of 48-in. U. S. cast-iron pipe for Grace Brothers, Honolulu.

ROPE TRAMWAY having six 1-in. track cables facilitates erection of Maple Terrace viaduct on Pittsburgh & West Virginia Railway by McClintic-Marshall Co. Erectors made two lifts of 42 tons each. *Photo from G. A. CAFFALL, Manager of Erection, McClintic-Marshall Co.*



CENTRAL MIXING PLANT

*for Audley Clarke Co., Brooklyn,
N. Y., is Largest Single Unit of
Its Type in the United States*



AS THE first of a series of central mixing plants built to supply ready-mixed concrete throughout the New York area, the Audley Clarke Co. of Brooklyn has recently installed what is claimed to be the largest and most complete single unit ever constructed in the United States.

This central mixing plant, designed, fabricated and erected by the Blaw-Knox Co., Pittsburgh, includes a complete bulk cement storage and handling system. Three 22-ft. diameter circular steel bins of 1,500-bbl. capacity, equipped with hopper bottoms, with water-tight steel covers and with ladders, vents and manholes, are provided to store the cement. The bins are loaded from barges with a Fuller-Kinyon pump and discharge into a series of Sprout Waldron & Co. screw conveyors which carry the cement horizontally to the receiving hopper of a vertical cement hopper.

The elevator discharges the cement into a two-compartment, 15-ft. diameter circular steel bin of 600-bbl. capacity located near the mixing plant. This bin is fitted with two discharge gates feeding into a screw conveyor, which, in turn, discharges into a cement weighing batcher mounted on the central mixing plant. Total storage capacity at this plant is 5,100 bbl.

The 300-ton aggregate bin, self-cleaning like the cement bins, is loaded by a stiff-leg derrick equipped with a clamshell bucket which discharges into a 10x10-ft. hopper fitted with a spout and mounted on a turntable to permit depositing of the load into any one of the four bin compartments. Operating platforms for the two-compartment cement bin and for the aggregate bin are included in the structural supports for the bins. The 3-cu.yd. Rex mixer is supported independently in order not to transmit vibration to the measuring

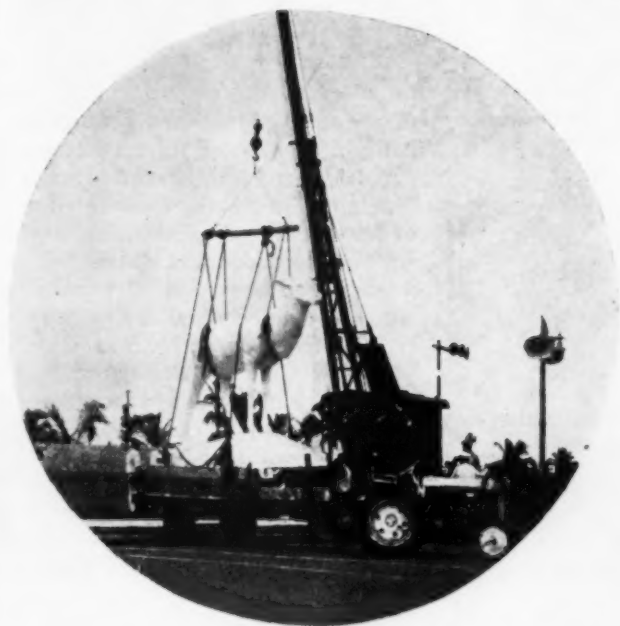
equipment, thus preventing inaccuracies of proportioning and reducing wear.

Proportioning equipment attached to the aggregate bin and used to control the concrete comprises a quadruple 16,000-lb. weighing batcher with four radial gates for the bin and a four-beam, multiple-type scale for measurement of fine and coarse aggregates; a 3,000-lb. weighing batcher for cement and a 250-gal. water-cement ratio measuring tank with compensating connection for moisture in aggregate. By means of this equipment one man can measure the necessary ingredients for a 3-yd. batch, operate the mixer and discharge the concrete. The concrete is hauled from the plant by 35 3- and 5-cu.yd. Blaw-Knox agitator bodies mounted on motor trucks.

The Turner Construction Co., New York City, acted as supervising engineer and constructed the foundations for the plant.

JOB ODDITIES

A Monthly Page of Unusual
Features of Construction



ELK HERDING with a Universal crane. W. A. Dickinson, of Miami, Fla., places nine plaster images of B.P.O.E. symbol along Bayfront Park to provide proper stage setting for order's convention.



UNITED THEY STAND! Cross-bracing between old buildings along narrow street in Hamburg, Germany, averts danger of collapse upon pavement.



WELDED STEEL SERPENT floats on surface of Chicopee River, at North Wilbraham, Mass. Daniel O'Connell & Son, of Holyoke, Mass., built this water supply pipe to shape of subaqueous trench before sinking it to river bottom.
Photo from E. R. PECKHAM, Universal Crane Service Co., Springfield, Mass.



MOVABLE MAIL BOX STAND can easily be rolled off shoulder of highway to allow grading. Carl Nelson, superintendent, and F. E. Smith, foreman, District 6, California Division of Highways, filled tire rim with concrete, embedding 2-in. pipe for riser, and placed mail box on piece of 6x6-in. guard rail post, beveled at each end.

Seventh of a series of articles on
the \$325,000,000 construction
program for flood control
in the Mississippi Valley

The Defense Against OLD MAN RIVER-VII

By ROBERT K. TOMLIN
Editor of *Construction Methods*

THREE methods of levee-building that depart from the more common standards of construction along the Mississippi River are represented by contracts of the Kaiser Paving Co., using huge crawler-mounted electric fresnos, at Walls, Miss.; the Canal Construction Co., using industrial railway haulage on a system of track loops between borrow pit and embankment at Norfolk Landing, Miss.; and Wilbanks & Pierce, Inc., using hydraulic dredges south of Rosedale, Miss. To date, in this series of articles, the chief types of levee-building equipment described and illustrated have been (1) draglines, (2) tower-cableway machines and (3)

Electric Fresnos—Loop Railways—Hydraulic Dredges

tractor-wagon outfits loaded either by elevating graders or small draglines.

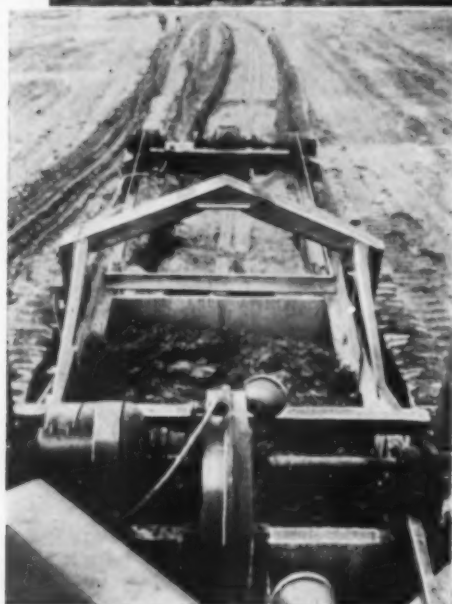
Electric Fresnos — The electric fresnos, developed by the Kaiser Paving Co., of Oakland, Calif., were introduced last year as an experiment

in large-capacity earth handling equipment for levee-building. Designed for haulage by a powerful crawler tractor (75-100 hp.) the special fresno, as illustrated herewith, consists of a set of buckets in four telescoping sections, with cutting edge and sliding tail gate, mounted on a welded steel frame, the whole being carried by a pair of crawler tractions each 16 in. wide and 9 ft. long. The telescoping buckets have a water-level capacity of 14 cu.yd., about double that of the largest crawler wagons ordinarily used along the river. As actually placed in the levee, however, less-than-capacity loads are usually handled by each fresno.

The weight of the equipment



ELECTRIC FRESNO, hauled by tractor, has four telescoping buckets with combined capacity of 14 cu.yd. Welded steel frame is carried on crawler tractions.



DETAIL (left) of fresno construction, looking toward rear end, showing electric motor for operating telescopic bucket sections.



SLIDING TAIL GATE (right) pushes material out of buckets when discharging. View looking forward toward tractor.



WET, BOGGY BORROW PITS are typical of levee-building conditions in the Upper Yazoo district of Mississippi.

(22,000 lb.) and its load of earth is distributed by the crawlers to limit the pressure on the ground to about 10 lb. per square inch. The purpose of the design is to provide a large, mobile, self-contained unit to dig, load, carry and discharge without the aid of any supplementary train of equipment other than the tractor which pulls it and supplies power for its operation.

The tractors for operating the five electric fresnos which A. B. Ordway, general manager, and H. P. Davis, superintendent, of the Kaiser organization installed, are heavy-duty machines, four of them Monarch "75" units with an innovation in the form



CUTTING EDGE of fresno bucket is raised or lowered by motor-operated rack and gear.



ELECTRIC GENERATOR on tractor is operated by rope drive from crank shaft and supplies current to motors controlling fresno operation.

of Diesel engines and one 100-hp. Cletrac with gasoline engine. On each tractor is rigged a 5-kw. electric generator rope-driven from the tractor to supply current to two 5-hp. electric motors operating the buckets and the sliding tail gates of the fresnos. One of these motors controls a rack gear for raising or lowering the cutting edge of the bucket while loading or dumping. A second motor pulls the telescopic bucket sections in or out

and operates the sliding tail gate which pushes out the earth while dumping. All operations are controlled from the tractor driver's seat.

The over-all width of the electric fresnos machine is 11 ft. 2 in. and the bucket opening is 6½ ft. wide. Last year's experience with these large, heavy units under the extremely trying conditions of wet, soft borrow pits prevalent in the upper Yazoo valley has lead the contractors to favor

lighter units—9 or 10 yd., instead of the 14- to 16-yd. capacity originally designed. A bucket 14 in. narrower than the original 6½-ft. width also is considered advisable. Originally the electrical control equipment for the fresnos was direct current, but after a period of operation a shift was made to alternating current. Frankly experimental, these electric fresnos were used on only a comparatively short stretch (21 stations) of levee in the upper Yazoo district.

Loop Railway Haulage—Construction methods on a new set-back levee, about 27 ft. high, near Norfolk Landing, Miss., are distinctive in the use



H. P. DAVIS (left), superintendent, and A. B. ORDWAY, general manager, for Kaiser Paving Co.



BORROW PIT for one of the loop railway units, showing dragline and train of side-dump cars hauled by industrial locomotive.

of a system of loop railway haulage developed and patented by Arthur J. Shea of the Canal Construction Co., Memphis. This scheme of levee building is designed particularly for conditions of long haul between borrow pit and levee section.

At the borrow pit a dragline excavator with 40- to 50-ft. boom loads earth into trains of 4- to 6-yd. hand-dump railway cars hauled by gasoline locomotive on track laid to form a loop between the pit and the levee embankment, as shown in the sketch at the top of p. 57. A variant of the loop is sometimes desirable in the form of a straight in-and-out system with passing track and switches. Along the line of the levee, just inside the toe

and adjacent to the tracks, is excavated an elongated dump pit. Here the train of loaded cars from the borrow pit is spotted. The earth fill



DUMP PIT (left) into which earth from borrow pit is discharged by railway cars for rehandling into levee section (right) by long-boom dragline. (In oval) T. F. SHEA, member of firm, Canal Construction Co.

is then discharged into the dump pit from which it is relayed to place in the embankment by a second and larger dragline with a boom from 60 to 80 ft. long. On each loop unit two trains of cars are operated, one loading while the other is discharging. Track in the borrow pit is shifted as material is taken out.

Under the loop railway scheme the levee is constructed in successive lengths of about 70 ft. The fill is placed in the embankment in three sections, first at the landside toe, second in the center of the section and third on the riverside slope. Work proceeds night and day.

On the Norfolk Landing levee, involving a total of about 1,700,000 cu.yd. of fill at a bid price of 24.35 cents per cubic yard, the Canal Construction Co., at the time the work was inspected, was operating four railway haulage units, three of them equipped with 3-ft. gage track and one with standard-gage (4 ft. 8½ in.) track. In addition, two pairs of draglines relayed material in to the riverside toe of the embankment and one dragline dressed the levee slopes.

A summary of the equipment used, practically all of it Diesel-powered, follows:

Unit No. 1—2 draglines (Monighan, 70-ft. boom; Bucyrus, 40-ft. boom); 2 locomotives (Vulcan 2-ton); 10 cars (Western, 4-yd.); 2,600 lin.ft. of 36-in. gage track.

Unit No. 2—For relaying material to riverside toe: 2 draglines (Monighan, 80-ft.; Bucyrus-Erie, 60-ft.)

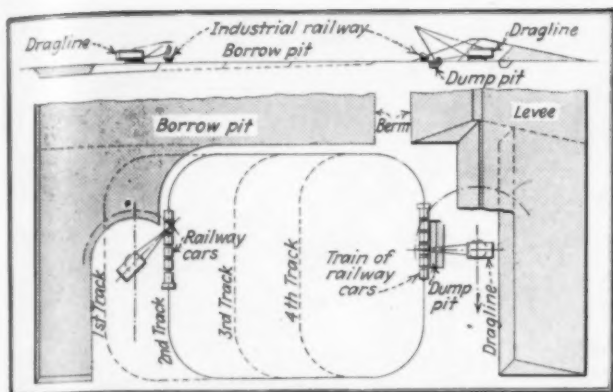
Unit No. 3—2 draglines (Monighan, 60-ft.; Bucyrus-Erie 40-ft.); 2 locomotives (8-ton Plymouth; 4-ton Vulcan); 12 cars (Western 5-yd.)

Unit No. 4—Relaying to riverside toe: 2 draglines (Monighan, 80-ft.; Bucyrus-Erie, 60-ft.)

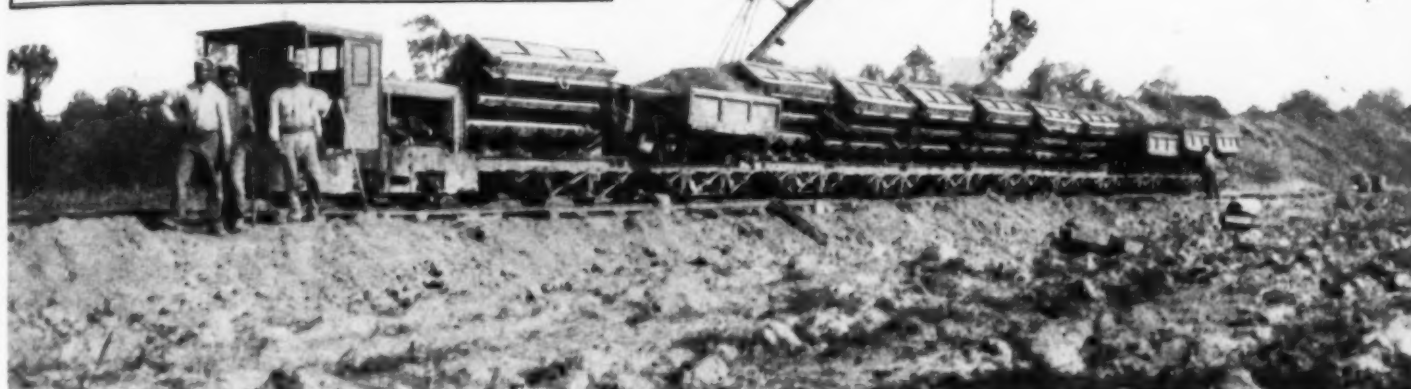
Unit No. 5—Standard gage; 2 draglines (P&H, 75-ft. and 55-ft.); 3 locomotives (10-ton Plymouth; two 8-ton Vulcan); 14 cars (Western, 6-yd.); 3,000 lin.ft. of standard-gage track.

Unit No. 6—2 draglines (Monighan, 60-ft.; P&H, 50-ft.); 2 locomotives (Vulcan 4-ton); 16 cars (Western 4-yd.); 3,000 lin.ft. of track.

Unit No. 7—Dressing levee slopes; 1 dragline (P&H, 40-ft.)



LOOP RAILWAY LAYOUT (left) showing trackage and equipment with relation to borrow pit and levee. (Below) TRAIN of side-dump cars discharging into dump pit along toe of levee.



Hydraulic Dredge Method — In building a new loop levee to replace, further inshore, an existing levee at Riverton, south of Rosedale, Miss., Wilbanks & Pierce, Inc., dredging contractors, used two 12-in. diesel-powered hydraulic suction dredges to pump fill from borrow pits into the embankment. The material was principally buckshot clay. The dredges, aided by a high river stage, reached

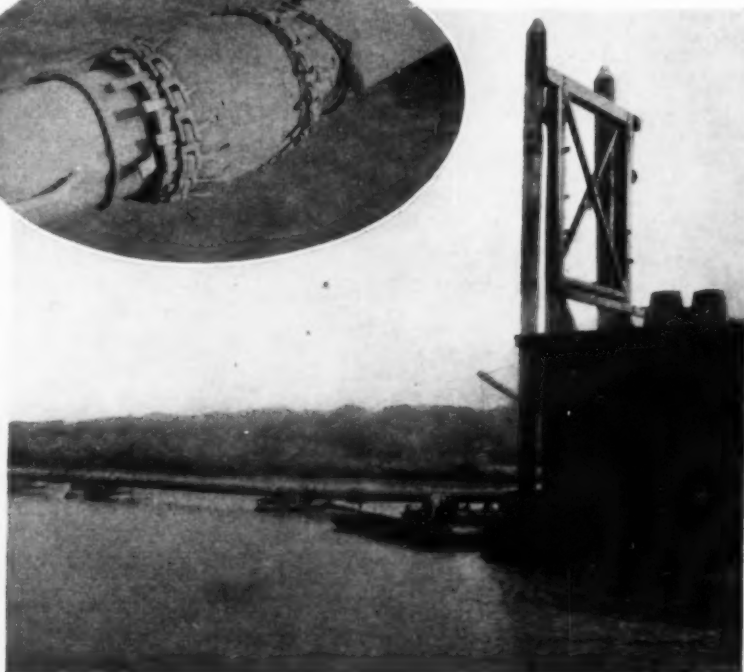
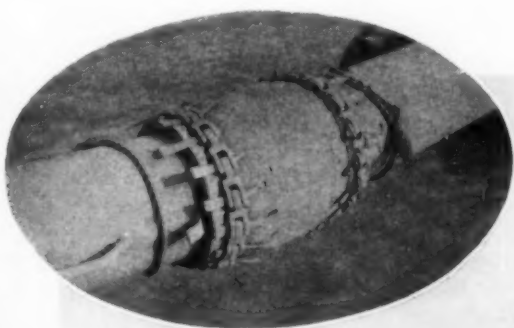
the job through basins cut into the river bank by a dragline. They were then floated through old borrow pits and a cut in the existing embankment to working position near the new loop levee. In the borrow pit rainfall and seepage provided sufficient water for floating the dredge, without recourse to the usual pumping in of river water to maintain a pool.

Meanwhile, with a dragline, parallel

retaining dikes were thrown up along the toe lines of the new levee and cross dikes were built, forming a long pool to receive the fill pumped in by the suction dredge. Depending upon the height of the levee the fill is made in one or more lifts; the latter case, of course, involving additional retaining dikes. For levees less than 24 ft. high the contractors have found it advisable to build in one lift, with retaining



JOHN R. WILBANKS of Wilbanks & Pierce.



HYDRAULIC SUCTION DREDGE, powered by Diesel engine, used by Wilbanks & Pierce to build Riverton (Miss.) levee. (In oval) Detail of flexible dredge-pipe coupling.



R. C. PIERCE, of Wilbanks & Pierce.



DRAGLINE places material in retaining dikes for second lift of hydraulic fill.



DRAINAGE DITCHES are cut in the dredged fill embankment to dry it out.

dikes 12 to 14 ft. high. Under these circumstances enough excess material is pumped in to allow for topping out to specified grade with draglines.

In building up the levee with dredged fill best results have been obtained by first carrying the pipe line down each side of the section close to the retaining dikes and finally directing the discharge of water-borne material down the center, thus obtaining as much crown as possible and reducing the rehandling of material for the top-

ping-out operation. Retaining dikes are kept at least 1,000 ft. ahead of the dredge and spillways to return the pump water to the borrow pits are located at 500-ft. intervals.

The 12-in. dredges used on this contract, under the direction of Capt. D. H. Mason, superintendent for the contractor, are equipped with 360-hp. six-cylinder Anderson Diesel engines and Morris centrifugal pumps with 14-in. suction and 12-in. discharge. The hull of the dredge measures

24x70x5½ ft., is of wood and draws 4 ft. of water. It is small enough to be readily moved on to the work or out into the river by the locking process. The hull structure is well braced to withstand strains when grounded.

The ladder is 38 ft. long and consists of a frame made of two 18 in. I-beams with suitable cross and diagonal bracing and with a heavy cast steel ladder head at the forward end. The cutter shaft is 4½ in. in diameter. The cutter is of the basket type and is made of cast steel. Four blades are used in clay and buckshot, and five blades in other material. It is highly important that the blades have the necessary amount of relief or pitch on the back side.

The 12-in. dredge pipe used is ¼ in. thick and in 15-ft. lengths. To reduce frictional losses the length of pipe between the dredge and the point of discharge is limited to 1,200 ft., averaging about 800 ft. To insure a satisfactory output of dredged material a velocity of flow of 15 ft. per second in the pipe line is desirable.

The type of pontoon found best adapted to the work, according to Mr. Wilbanks, consists of two corrugated drums 24 in. in diameter by 20 ft. long, set 9 ft. apart, across which are placed three 6x8-in. timbers which in turn support saddle blocks carrying a 40-ft. length of pontoon pipe, 12 in. in diameter. The pipe is set parallel to the pontoon drums. The drums are fastened to the timbers by means of hoop bolts.



PIPE LINE DISCHARGE from dredge showing Mississippi buckshot clay being placed hydraulically to form levee. (At right) Capt. D. H. MASON, superintendent for Wilbanks & Pierce, dredging contractors.

[NEXT MONTH: Another article on construction for Mississippi River flood control.]

Present and Accounted For -

A Page of Personalities



H. P. CHAPMAN, for the last five years assistant engineer, has been appointed chief construction engineer of the Ohio Department of Highways. Before entering the department 9 years ago he had served with the American Zinc Co. and the Pennsylvania Railroad.

MRS. FRANCES WILLIAMS (below) of Boston, one of the few women who can operate a steam shovel, relieves her husband at the levers during demolition of Boston's Post Office building.

©P4A



©Pennsylvania
Dept. of Highways

W. A. VAN DUZER, assistant chief engineer of the Pennsylvania Highway Department, was installed last month as president of the American Road Builders' Association.



B. P. McWHORTER has been named state highway engineer of Georgia, succeeding W. R. Neel, resigned.

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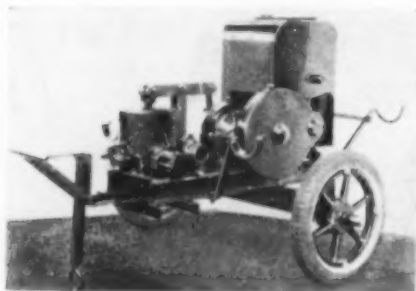


MAJ. THOMAS F. FARRELL, formerly Commissioner of Canals, has been selected as chief engineer of the New York State Department of Public Works, succeeding the late Col. William M. Acheson.

NEW EQUIPMENT ON THE JOB

Something New in Pumps

The elimination of extensive servicing by getting rid of diaphragms, packing or oil seal is the unusual feature of the new pumps being marketed by the Novo Engine Co. of



Lansing, Mich. The company claims that its latest product is entirely new in principle, design and performance.

Two rubber rings on the plunger that roll with the action of the piston as they are pressed against the cylinder wall maintain a liquid-tight water seal. Rolling of these rings prevents friction and wear.

The plunger operates at 120 strokes per minute, forcing the water through the pump at a high velocity and maintaining a more constant and uniform flow.

The pump weighs 960 lb. with a capacity of 3,500 to 5,000 gal. per hour and develops a 100-ft. head. It may be mounted on a rubber-tired trailer or a four wheel truck.

1/2-Yd. Convertible Excavator

In developing its new Model 4 1/2-yd. excavator, the Orton Crane and Shovel Co., Chicago, Ill., has incorporated a number of improvements designed to increase and promote ease of handling while digging, hoisting, swinging or



traveling. The excavator is equipped with a 40-hp., 4-cylinder gasoline engine provided with an accelerator for hand or foot operation, an electric starter, an oil filter, an air cleaner and other up-to-date accessories.

Traveling speed may be varied from 1/2 to 3 miles per hour, depending upon

the ground over which the machine travels, negotiation of 25-per cent grades being possible.

The main hoisting drum gives a single line speed of 160 ft. per minute. Sluing can be done at a speed of 4 r.p.m.

The excavator may be converted into a shovel, crane, dragline, ditcher or skimmer.

A Mechanical Bulldozer

A gear-operated blade is considered the outstanding feature of its new Bully bulldozer by Niess & Co., Inc., of Minneapolis. This machine, designed for use with Cletrac and Monarch tractors, has a power transmission unit composed of pinion and bevel gear, together with spur pinion and



gear segment, and used with a twin-disk clutch and brake.

The gear-operated blade insures positive action, wide travel radius and high lift. A single lever controls operation.

The Bully is made in two types—the bulldozer with rigid blade and the backfiller with adjustable blade.

Waterproofs Under Pressure

For waterproofing portland cement concrete and mortar or accelerating the setting time the American Sika Corporation has introduced a liquid compound, developed by a Swiss chemist, to be added to the mixing water to give dilutions of 1 part Sika to 12-15 parts of water. The product is claimed to be effective in stopping flows of water even under conditions where pressure cannot be removed during operations. Among its applications as a waterproofing and leak-arresting agency, principally in the British Empire to date, are in basement walls and floors of buildings, tunnel and shaft linings, subways, bridges, retaining walls, dams, reservoirs and other structures. The compound, manufactured in various grades to suit requirements of waterproofing and quick set (from 30 sec. upward) is applicable, according to its manufacturers to conditions of running water or even of sealing a hole or joint under a considerable head.

For Heavy-Duty Service

Built for heavy-duty service and to provide a wide margin of safety over their rated load capacity, the Trackson Co. of Milwaukee, claims for its new crawler wheels a longer life, lower maintenance cost and freedom from costly delays on the jobs on which they are used.

The wheels have large diameters



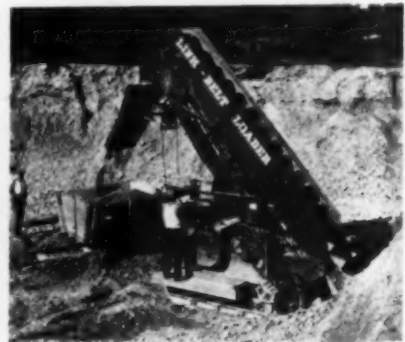
and wider tracks, making pulling easier. The tension members, track shoe hinges, track shoes and wheels are all heat-treated and hardened, thus insuring a longer life for these parts.

The approximate weights of sets of two crawler wheel assemblies, without axles, are: 15-ton, 5,150 lb.; 10-ton, 3,500 lb.; 6 ton, 2,800 lb.

High-Capacity Bucket Loader

A high-capacity crawler bucket loader, known as the Grizzly, 1930 Model, has been developed by the Link-Belt Co. of Philadelphia.

A feature of this new loader is the self-feeder of the continuous helical ribbon type which feeds and cleans up



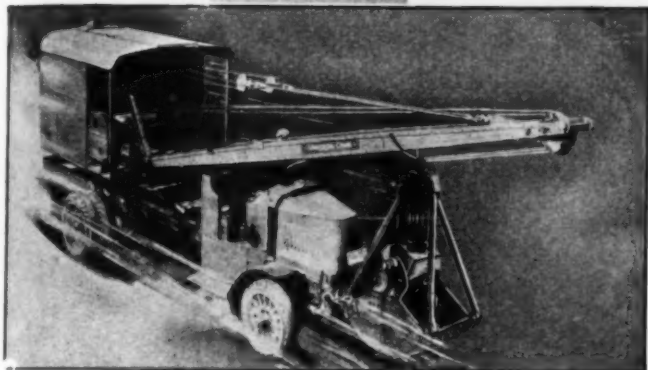
uniformly. With its self-sharpening spiral and cutting edge it cuts, digs and conveys material to the elevator buckets in a smooth, continuous, uniform stream. The operator, riding on a side platform, controls the feeder's adjustment by a hand wheel.

When handling sand, stone and gravel 1 1/2-in. or smaller, the machine has a rated capacity of 1 1/2 yd. per minute; larger stone is handled at less capacity.

The power unit for operating the loader is a 30-hp. Buda gasoline engine or a 20-hp. electric motor.

The UNIVERSAL is the Same Dependable Machine on any of these Mountings

Motor Truck:



10 to 15 miles an hour traveling speed. Here is the machine that can handle 1001 "short crane jobs" at a profit. Gets there, does the job and is gone before slower equipment can be placed.

Motor Truck (Christie) Crawler:

Eight rubber tired, load-carrying wheels on pavement; for traction off the highway, crawlers may be attached as easily as a set of tire chains.



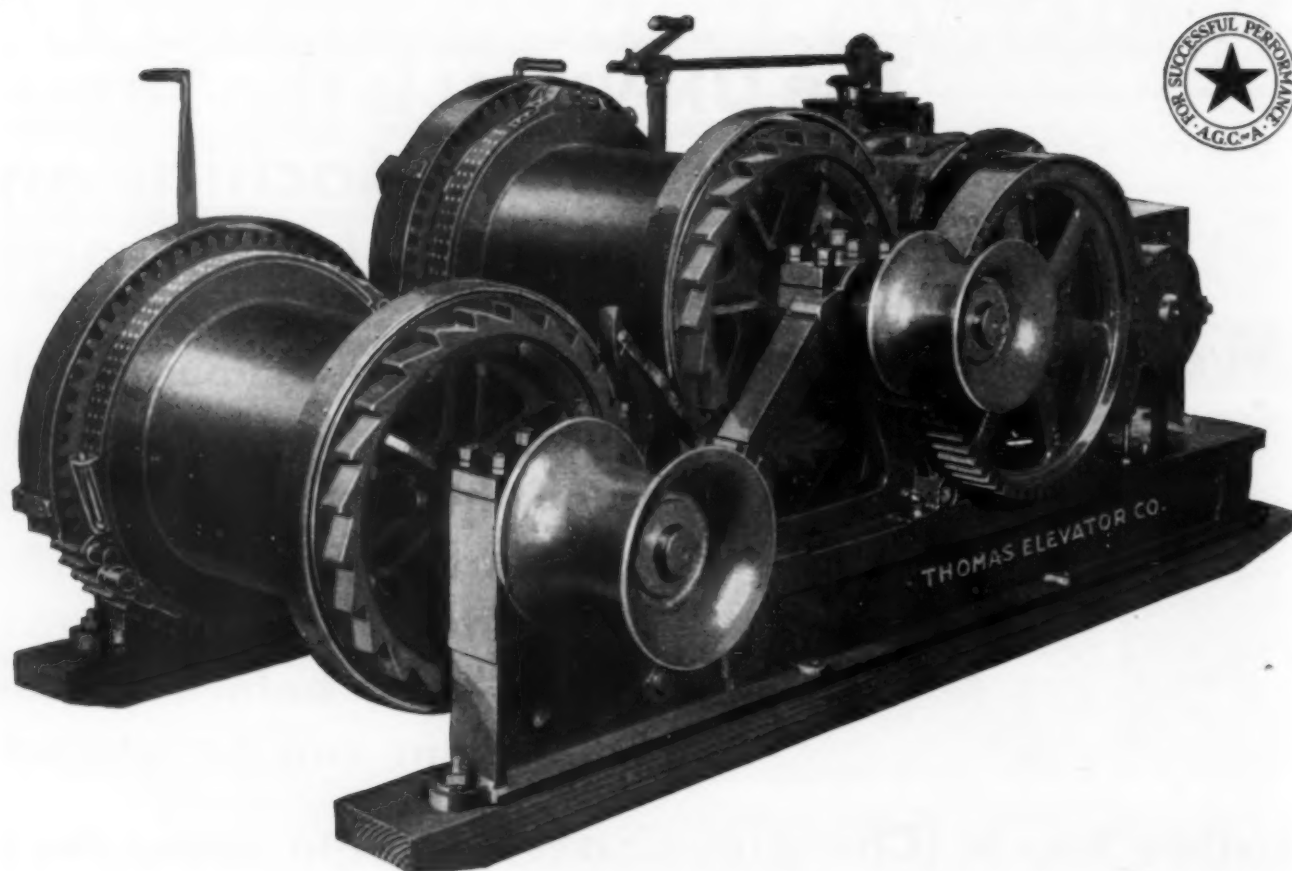
2 Speed Center Drive Crawler:

the same design as the mounting for the famous Lorain 75. The Universal 35 gives you a $\frac{1}{2}$ yd. machine big enough to handle a sizeable job alone yet small enough to be profitable on jobs where big machines won't pay.

THE UNIVERSAL CRANE CO.
Lorain, Ohio



UNIVERSAL



THOMAS ELECTRIC HOISTS

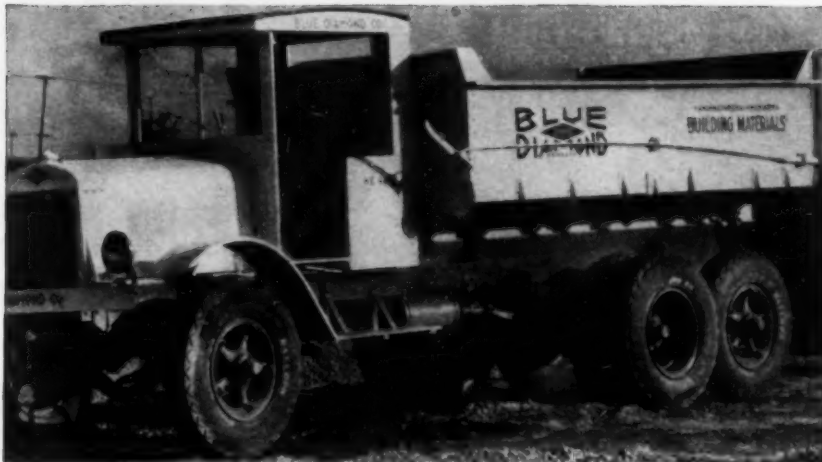
Built in all standard sizes and many special designs. Thomas Electric Hoists are undoubtedly the finest. Quality is built right into them. V-type band frictions and automatic motor brakes are exclusive Thomas features.

THOMAS ELEVATOR COMPANY

20 SOUTH HOYNE AVENUE .

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"40,000 MILES - STILL RUNNING" -

Goodyear Balloon Truck Tires are piling up big mileage everywhere

Here is a typical report on Goodyear Truck Balloon Tires in building supply service. These tires "have gone approximately 40,000 miles, and up to the present time none has been discarded."

"The balloon tires that we have purchased have been less susceptible to punctures and rock cuts than high-pressure tires, and

seem to give superior traction—due, no doubt, to the increased road contact area."

Such is the experience of Blue Diamond Company, Los Angeles, California, manufacturers, producers, distributors of building materials. In this plain statement of fact you find the most eloquent reasons for using these remarkable new tires on your trucks—40,000

miles and still going—greater traction in all the places a building material truck has to go—greatly reduced damage from punctures or rock cuts—and, as hundreds of others will tell you, astounding endurance on fast long hauls.

Find out about these newest Goodyears now, from any Goodyear Truck Tire Service Station Dealer.

ON YOUR NEW TRUCKS SPECIFY GOODYEARS

GOOD YEAR

MORE TONS ARE HAULED ON GOODYEAR TIRES

THAN ON ANY OTHER KIND



ALL STEEL



AIR PRESSURE SCARIFIER

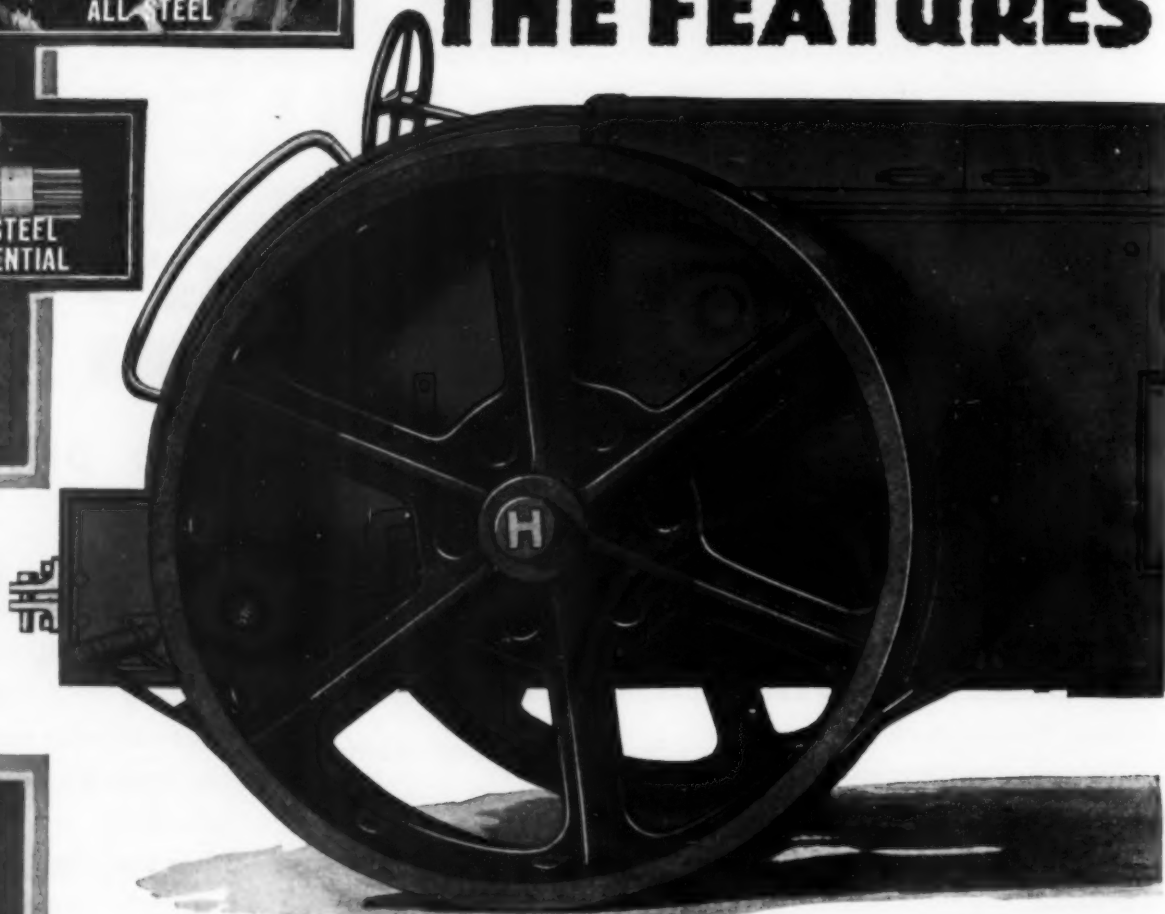


CAST STEEL WHEELS



CAST STEEL DIFFERENTIAL

THE FEATURES



THE ALL-STEEL, ALL-PURPOSE,

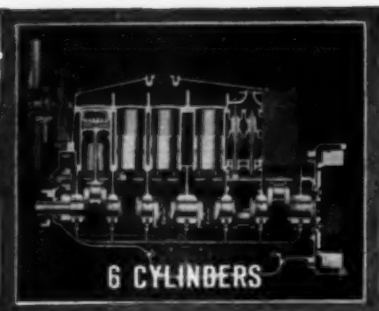
Outstanding performance! HERCULES *the* Roller is emancipating the contractor from the roller worries of the past. This remarkable tool—the result of many years of experience in building road-making machinery—is establishing records for fast and efficient work, low operating and maintenance costs, flexibility, mobility, power and ease of handling. All-steel construction, three speeds in each direction, six cylinder seven bearing crankshaft motor with 35% reserve

THE HERCULES

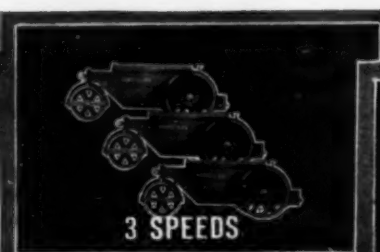
A Subsidiary of The
MARION,



7700 lb. DRAWBAR TEST



6 CYLINDERS



3 SPEEDS

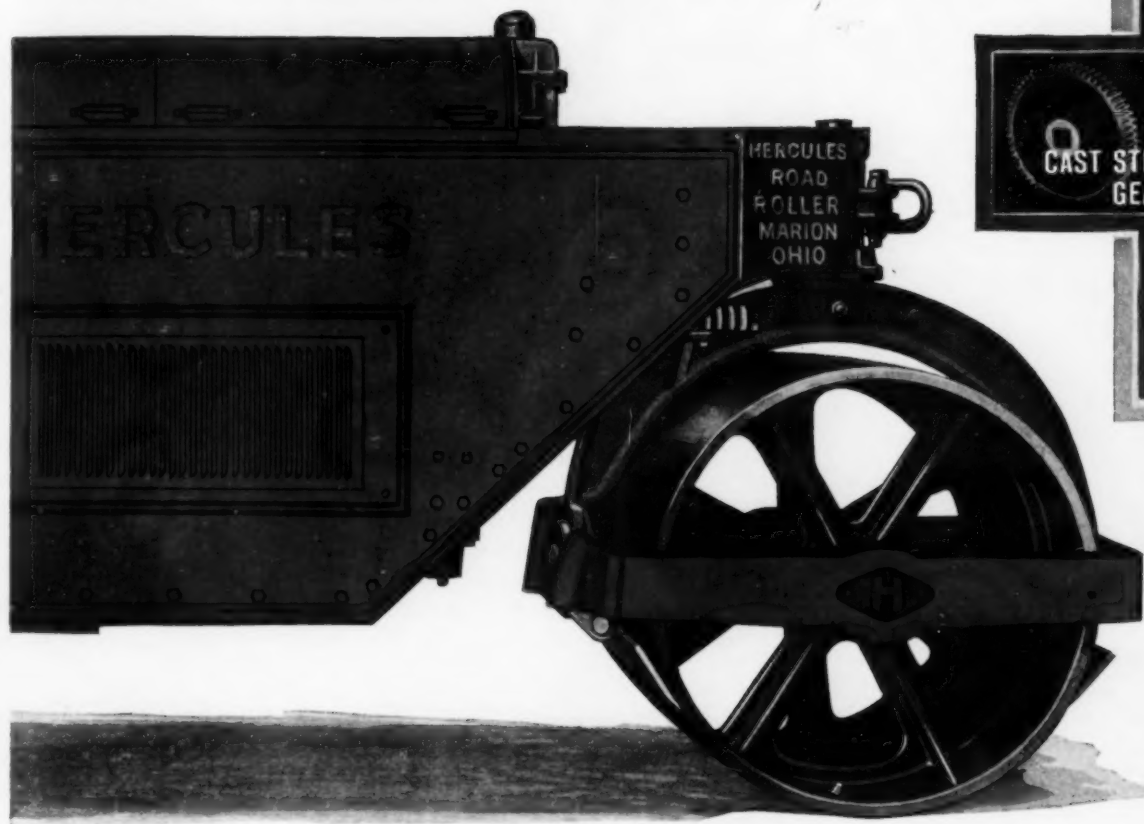


52 BALL AND ROLLER BEARINGS

OF HERCULES



CAST STEEL BULL GEARS

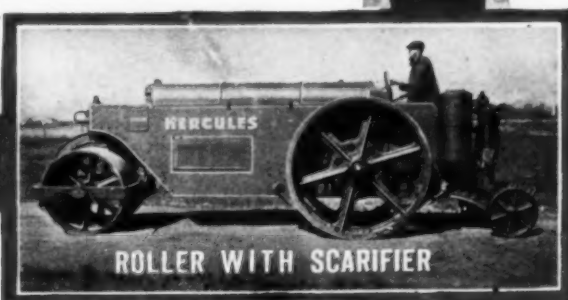


LONG-SERVICE ROAD ROLLER

power, ball and roller bearings throughout—fifty-two of them, all gears and clutches enclosed and running in a bath of oil, one lever for forward and reverse motions, seventeen hundred pound drawbar pull—the most powerful roller built. There isn't a rolling job it won't handle better, cheaper and faster. Introduced this year and already specified by six State Highway Departments. Its on the biggest contracts this year. Sold by the leading Contractors' Equipment Dealers.

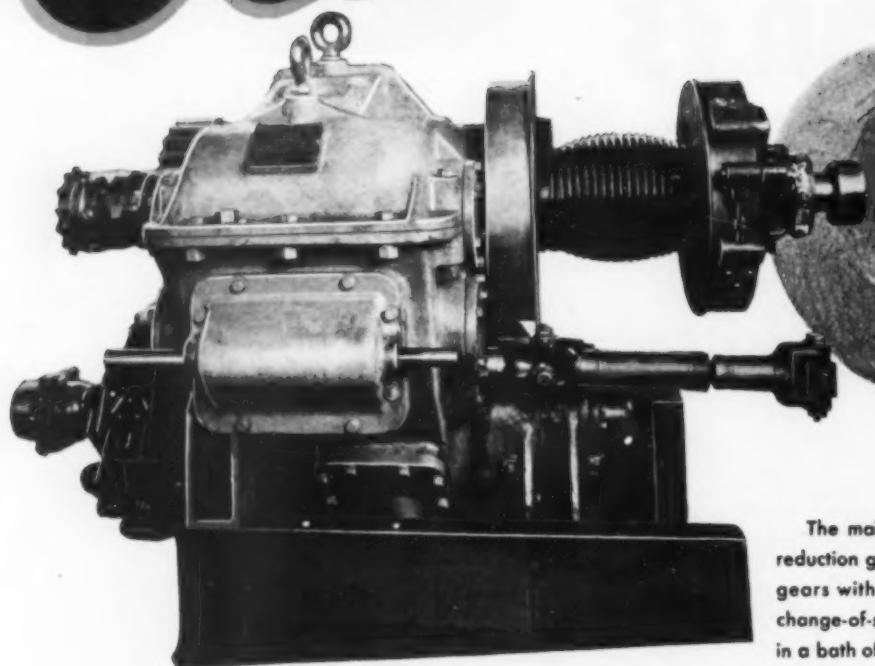
COMPANY

Osgood Company
OHIO



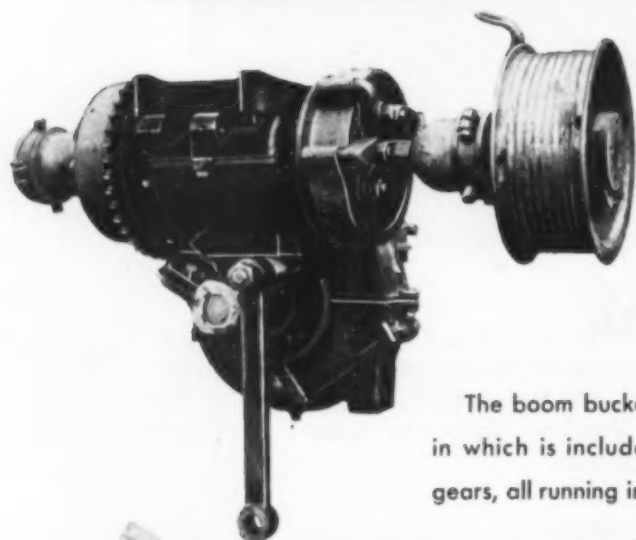
ROLLER WITH SCARIFIER

Ransome



The main Gearing Box contains reduction gears, traction drive bevel gears with their jaw clutches and change-of-speed gears, all running in a bath of oil. Note the accessible construction.

A third enclosed gear box is used for the power boom swing



The boom bucket gear box assembly in which is included power discharge gears, all running in a bath of oil.



27C MASTER PAVER

A BRUTE FOR WORK

MORE POWERFUL . . . STURDIER . . . FASTER . . . LOWER IN HEIGHT
SIMPLER IN DESIGN THAN EVER

Water control is *accurate*. It is not affected by grades or by sudden starting or stopping of the paver when tank is discharging into drum. Adjustment is made by a handwheel carried to operator's platform. Water valve, non-by-passing type.

Boom swings through an arc of 170 degrees.

Powered by a 6-cylinder, heavy-duty, 65-70 h. p. gasoline engine.

The new Ransome "Master" Paver will make you master of the biggest paving jobs.

Write for a folder today which gives complete specifications.

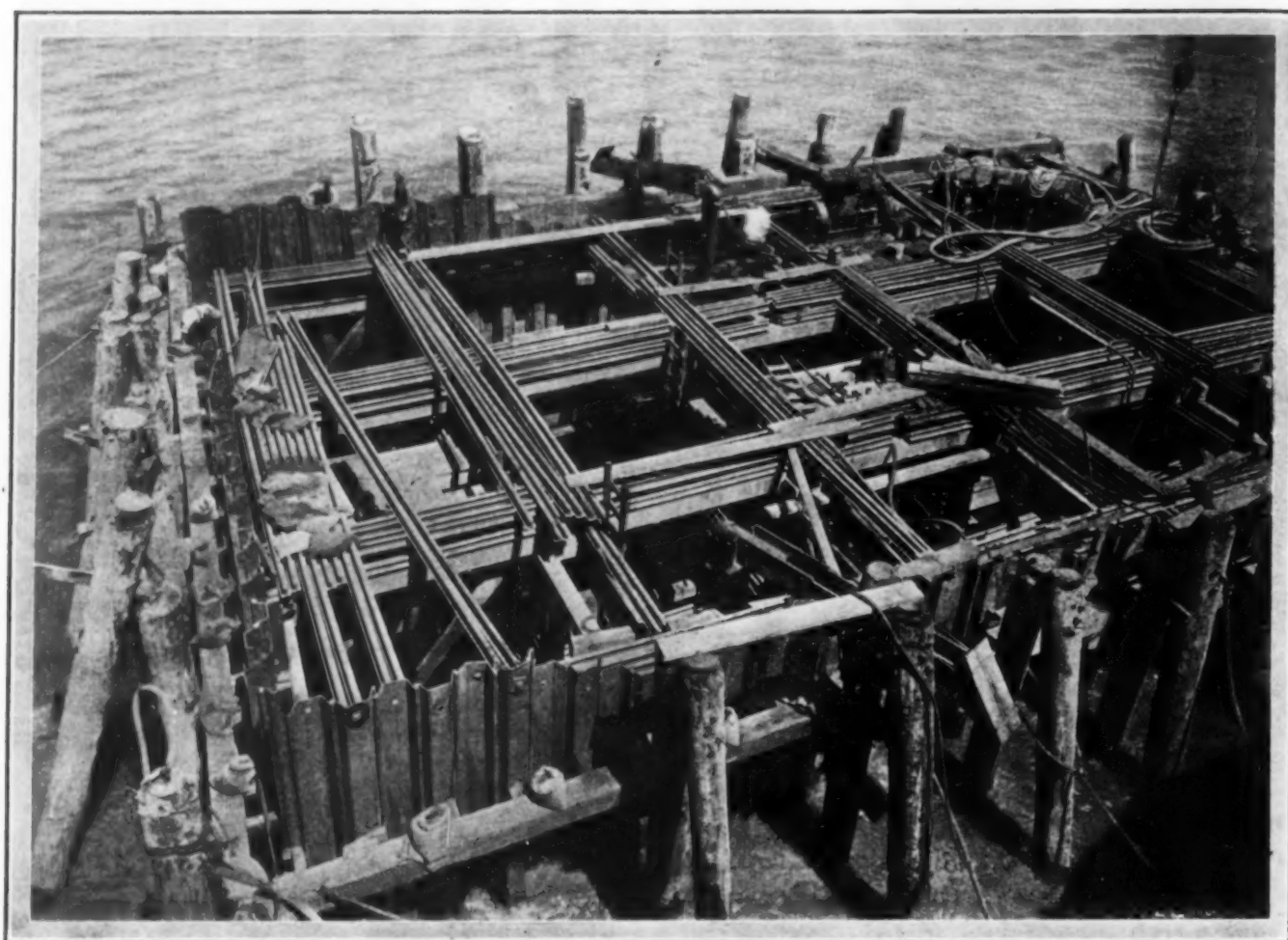


Ransome Concrete Machinery Company

1850 — Service for 80 Years — 1930

Dunellen

New Jersey



LACKAWANNA Deep-Arch PILING used in single-wall cofferdam, 58 feet deep, for the construction of Pier 11, Suisun Bay Bridge

This 47- x 71-foot cofferdam was built of Lackawanna Deep-Arch Section DP 165, in 65-foot lengths. The steel sheet piling was driven to an average of 3 feet into the shale rock bottom, timber bracing sunk to position inside, and the cofferdam unwatered to rock, 58 feet below water level.

Three 10-inch centrifugal pumps unwatered the cofferdam. After unwatering, a single Pulsometer pump was sufficient to hold down the leakage.

Upon completion of this pier, the sheet piling was pulled and used at another of the piers.

Contractors—Siems, Helmers and Schaffner, Inc.
—St. Paul, Minn.

BETHLEHEM STEEL COMPANY, General Offices: Bethlehem, Pa.
District Offices: New York, Boston, Philadelphia, Baltimore, Washington,
Atlanta, Buffalo, Pittsburgh, Cleveland, Cincinnati, Detroit,
Chicago, St. Louis

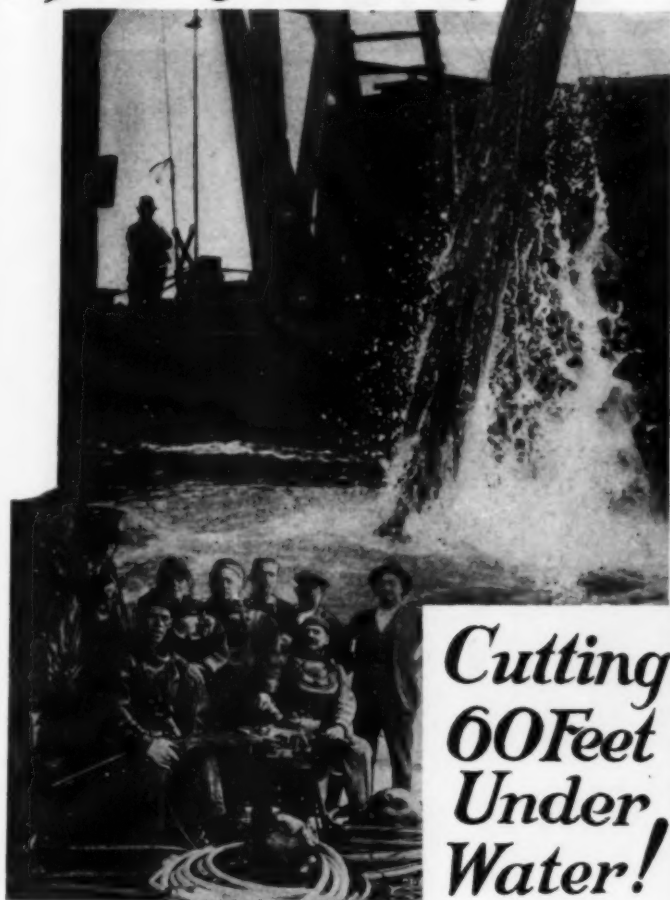
Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco,
Los Angeles, Seattle, Portland, Honolulu.
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BETHLEHEM



THERE IS A LACKAWANNA SECTION FOR YOUR PARTICULAR PURPOSE

Up They Come!



Cutting 60 Feet Under Water!

IN Vancouver is a remarkable example of the utility and stamina of the Wolf Air Driven Saw being used by the District Drainage and Sewage Board 60 feet under water with two divers cutting off 16" fir piles at an average of 1½ to 2½ minutes per pile! They cut six piles at a time. Then they bring the saw and equipment to the surface where the motor and saw are examined, teeth sharpened if necessary and motor lubricated.

Then they go down again. Piles are covered with sand, gravel and foreign matter and the water is so slimy that divers are unable to see their work. Water temperature averages 55 degrees and there has been absolutely no sign of motor freezing.

The Wolf Saw is available in A.C. 110 or 220 volts, 60 cycle, 3 phase, or D.C. 115 or 230 volts, or Air Driven Ingersoll-Rand or Chicago Pneumatic equipped.

REED-PRENTICE CORPORATION
Worcester, Mass., U. S. A.

WOLF



Portable Timber Sawing Machine

IN THE PUBLIC EYE



THERE is probably no danger signal on the road that causes such prompt and willing obedience to its warning as a Dietz "Red" Lantern.

For this most important reason, plus reasons of unequalled economy, Dietz Red Lanterns are the best night warning lights that contractors doing highway work can use for protection of the public and their own interest.

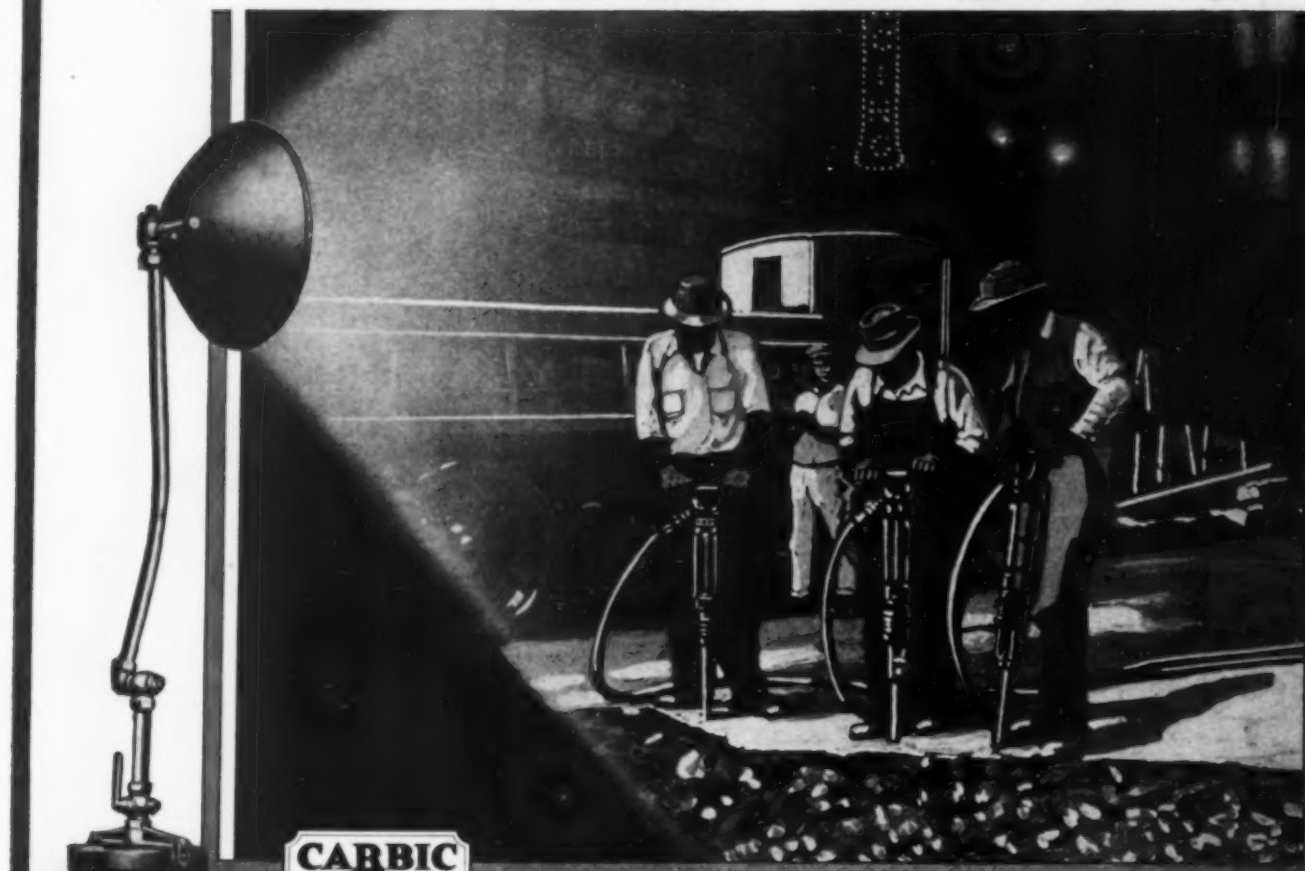
In places where an extra bright light and a long time between fillings is desired we recommend Dietz Cold Blast "Little Giant" Lantern—illustrated. It is 11½ inches high—Burns 70 hours.

R. E. DIETZ COMPANY
NEW YORK

*Largest Makers of Lanterns
in the World*
FOUNDED 1840



Hustle through with CARBIC LIGHTS



CARBIC

PROCESSED CARBIDE FOR
CARBIC LIGHTS & GENERATORS

*Carbic is distributed by
the Union Carbide Sales
Company through its na-
tional chain of ware-
houses and is sold by
jobbers everywhere.*

Carbic Flood Lights provide strong, clear, penetrating, diffused illumination and enable work to continue full force with safety after dark.

The initial cost of Carbic Flood Lights is low, and operating expense is negligible.

Contractors in every branch of industry are hustling through to greater profits with Carbic Lights.

Technical Publicity Dept. C.M. 6-30 12th floor
205 East 42nd Street, New York, N. Y.

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Street Address.....

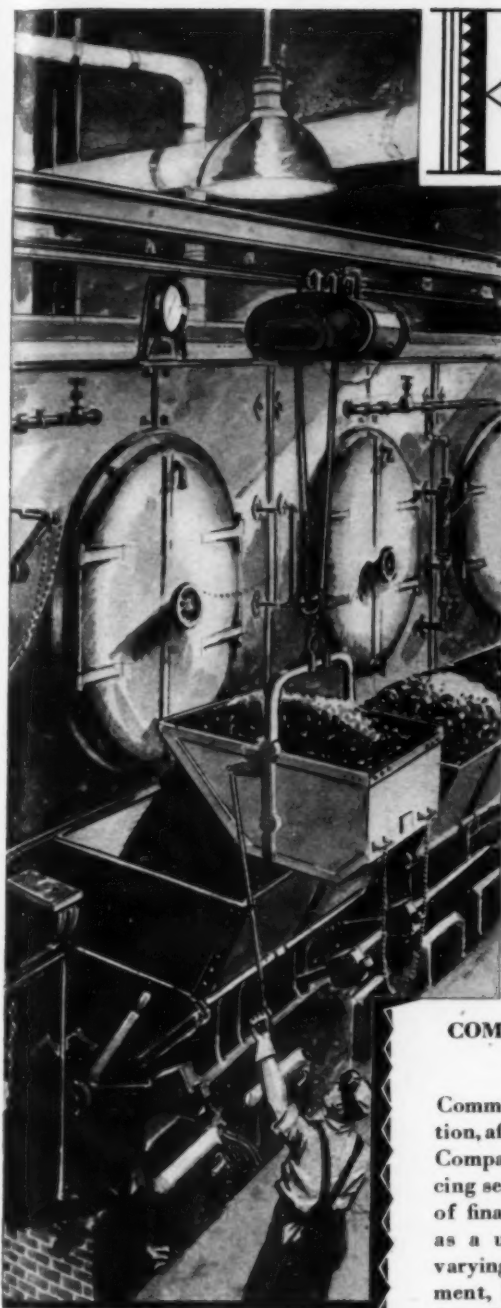
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OXWELD ACETYLENE COMPANY

Unit of Union Carbide **UCC** and Carbon Corporation

NEW YORK

Sales Offices in Principal Cities



FINANCING...

Single units or Complete Plants

ECONOMICAL production depends largely upon the elimination of waste in industry. The efficient handling of materials from the raw state through the stages of fabrication to the finished product requires a wise selection of materials handling equipment for every operation.

It is not necessary to impair working funds to buy materials handling equipment outright. It can be bought on a Commercial Credit Plan which allows payment from increased earnings.

Commercial Credit deferred payment plans are available for the financing of *all kinds* of income-producing machinery and equipment. Modernization is at your command.

Write, today, for full information.

COMMERCIAL EQUIPMENT CORPORATION

Commercial Equipment Corporation, affiliation of Commercial Credit Companies, provides a further financing service to industry. Its method of financing complete installations as a unit, requiring two or more varying types and makes of equipment, has been approved and endorsed by many of the country's leading engineers.



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CASH CAPITAL and SURPLUS \$58,000,000

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COMMERCIAL CREDIT COMPANIES, Baltimore, Maryland

Give us full information, without obligation, about Commercial Credit Plans.

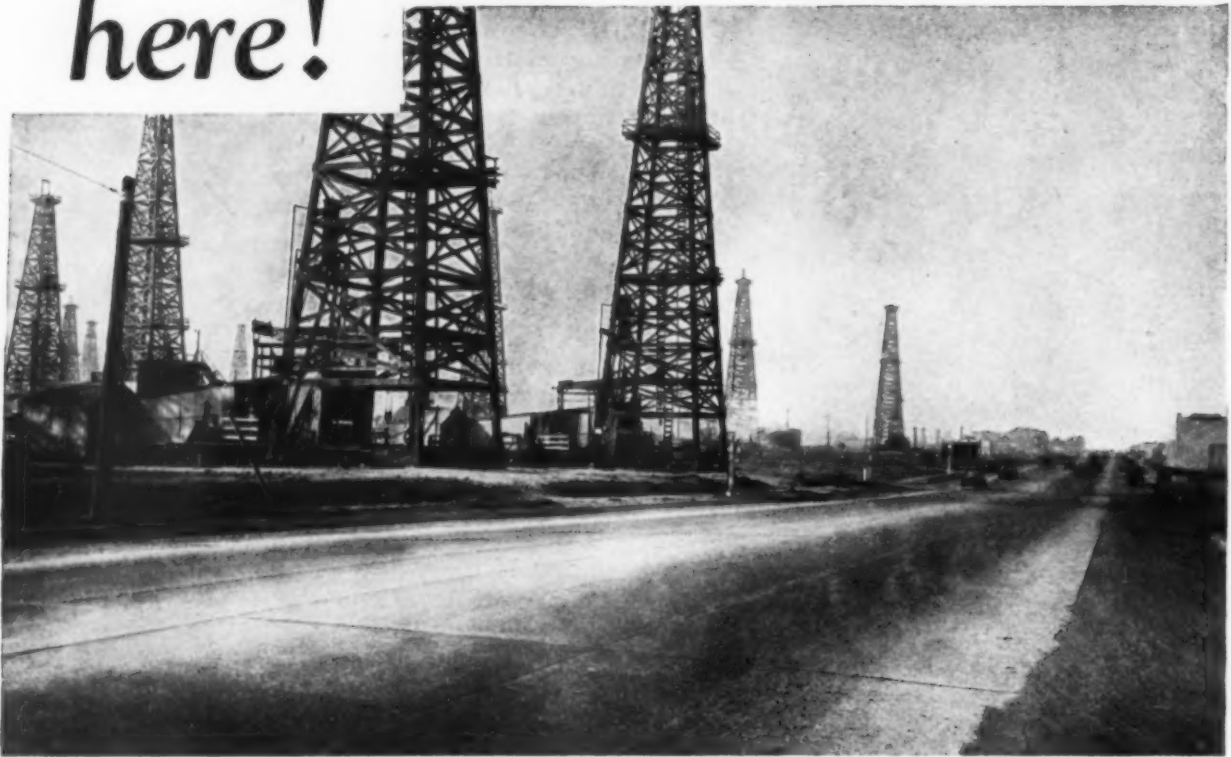
Firm Name

By

Address

Title

They did a *thorough* construction job here!



Atlantic Boulevard, near Signal Hill, at Long Branch, California. This smooth, forty-foot concrete highway, which carries heavy truck traffic through the oil fields, is protected against expansion and contraction strains by Carey Elastite Expansion Joint.

WHEN the contractors built this fine boulevard through the oil fields of California, they insured its lasting smoothness. They provided for inevitable expansion and contraction—protected the concrete, perfectly and permanently, with Carey Elastite Expansion Joint.

*Economical, indispensable,
wherever concrete is used*

The pioneer Carey Elastite Expansion Joint, now being used in every State in the Union, is preformed under heavy pressure—compounds of asphalt and fibre, sandwiched between sheets of asphalt-saturated felt. Flexible—never brittle or runny at any temperature. Indispensable for roads and sidewalks, bridges and dams, airport runways and pavements—in all concrete construction work. Have us send you our illustrated manual on Expansion Joint installation.

THE PHILIP CAREY COMPANY, Lockland, CINCINNATI, OHIO

**Carey
Elastite**
EXPANSION
JOINT



“Good practice”

INCLUDED in a committee report rendered to the American Road Builders Association is this significant recommendation—“Buy the best equipment and hire the best operators. *In the purchase of equipment the best policy is to buy on merit and the reliability of the manufacturer!*”

Looking back over the seventy-two years that have passed since our first scraper was put to work, we feel that Austin-Western Road Machinery could not occupy its present position in the field unless a majority of those responsible for building and maintaining roads had felt that it was always

worth the price asked—and that we, as manufacturers, were entirely reliable.

This appreciation for Austin-Western Road Machinery has grown slowly along with the development of modern road building. Its roots are deeply embedded in the knowledge that every new development and improvement in Austin-Western equipment has reduced labor and made it possible to accomplish more at lower costs.

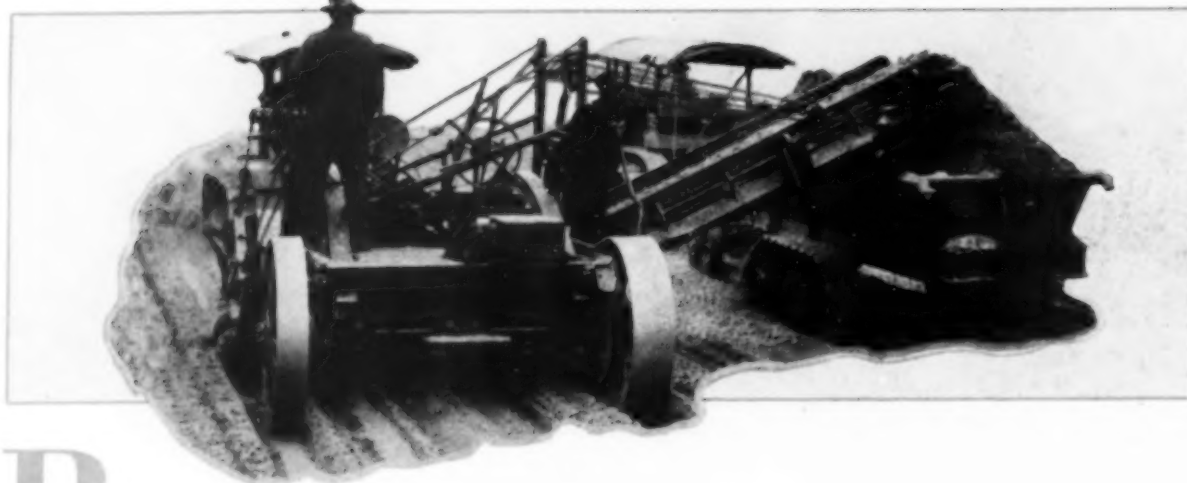
Experience has proven, time and again, that it is indeed “good practice” to use Austin-Western Road Machinery.

Austin-Western

ROAD MACHINERY

AUSTIN-WESTERN ROAD MACHINERY—COAST TO COAST





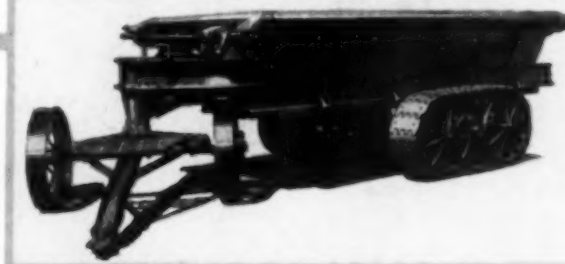
Reduce earth moving costs

Used separately or together, these two great machines probably do more to reduce earth moving costs than any other pieces of equipment in the field.

Western Crawler Dump Wagons

With its huge load, equal to that of many ordinary dump wagons, the Western 7-yard Crawler Dump Wagon will go wherever the most powerful tractor can lead. As ninety per cent of the load is carried on the broad Athey Truss Wheels, it can be pulled, heavily loaded, over soft ground, rough ground or sand. The capacity of this all-steel wagon, combined with its speed of operation, makes it a great dollar saver.

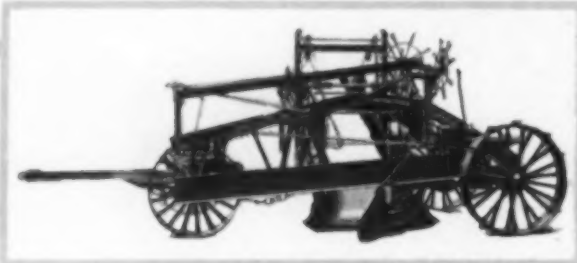
For smaller earth-handling jobs there is the Western 5-yard Crawler Dump Wagon. This wagon has all the features of the 7-yard model



The Western 7-Yard Crawler Dump Wagon

except the front trucks, as the entire load is carried and balanced on the Athey Truss Wheels.

Where the greatest possible yardage per trip is required, the 10-yard Western Crawler Dump Wagon is ideal. It is similar to the 7-yard model, but has higher side walls and heavier Athey Truss Wheels.



The Austin Contractor's Special Elevating Grader

Elevating Graders

There are Austin-Western elevating graders to meet every condition of earth handling. The Austin Contractor's Special Elevating Grader has been designed to provide maximum strength, capacity and durability when working behind the most powerful crawler type

tractors. It can be fitted with the Austin Power Take-Off to drive the elevator directly from the tractor. There is also the Austin New Era Elevating Grader for less severe work.

The Western Lever Special, as its name suggests, is especially designed for use where enormous tonnage is a first requirement. The carrier is driven by a 4-cylinder engine mounted on the rear platform, relieving the tractor of part of its load. There are two other Western models: the Western Standard Elevating Grader and a third model patterned after the Standard but equipped with a power take-off to operate the elevator directly from tractor.

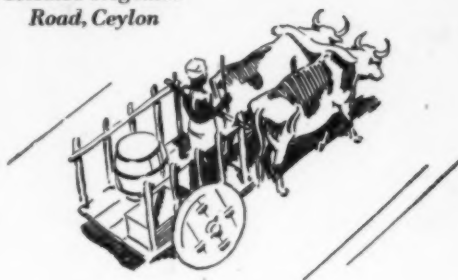
THE AUSTIN-WESTERN ROAD MACHINERY CO.

400 North Michigan Avenue • CHICAGO, ILLINOIS • Branches in principal cities

Leaning Wheel Graders, Straight Wheel Graders, Motor Graders, Elevating Graders, Crawler Dump Wagons, Scarifiers, Rock Crushers, Portable Conveyors, Rollers, Motor Sweepers, Street Sweepers, Sprinklers, Road Oilers, Hot Patch Portable Asphalt Plants, Plows and Scrapers.

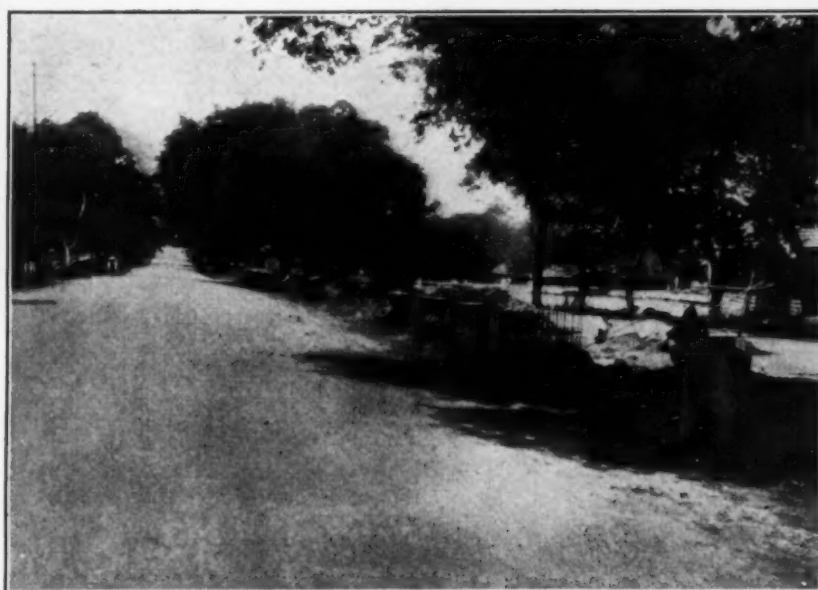
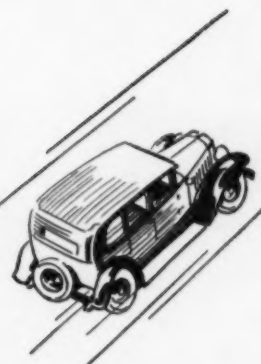


Colombo-Negombo
Road, Ceylon



COLAS ROADS

*set a new
pace in the FAR EAST*



Staveley Road
Poona, India

PROOF against the heat of the burning tropical sun, impervious to the moisture of the long rainy season, these Colas roads in India and Ceylon are giving excellent service.

Wherever an efficient, economical road binder is needed, use Colas. It assures satisfactory results.

Colas roads are non-skid, waterproof, durable and economical.

If you are interested in the construction or maintenance of good roads, write us for complete information on this effective cold asphalt emulsion.

FLINTKOTE ROADS INC.

(COLAS LICENSEES)

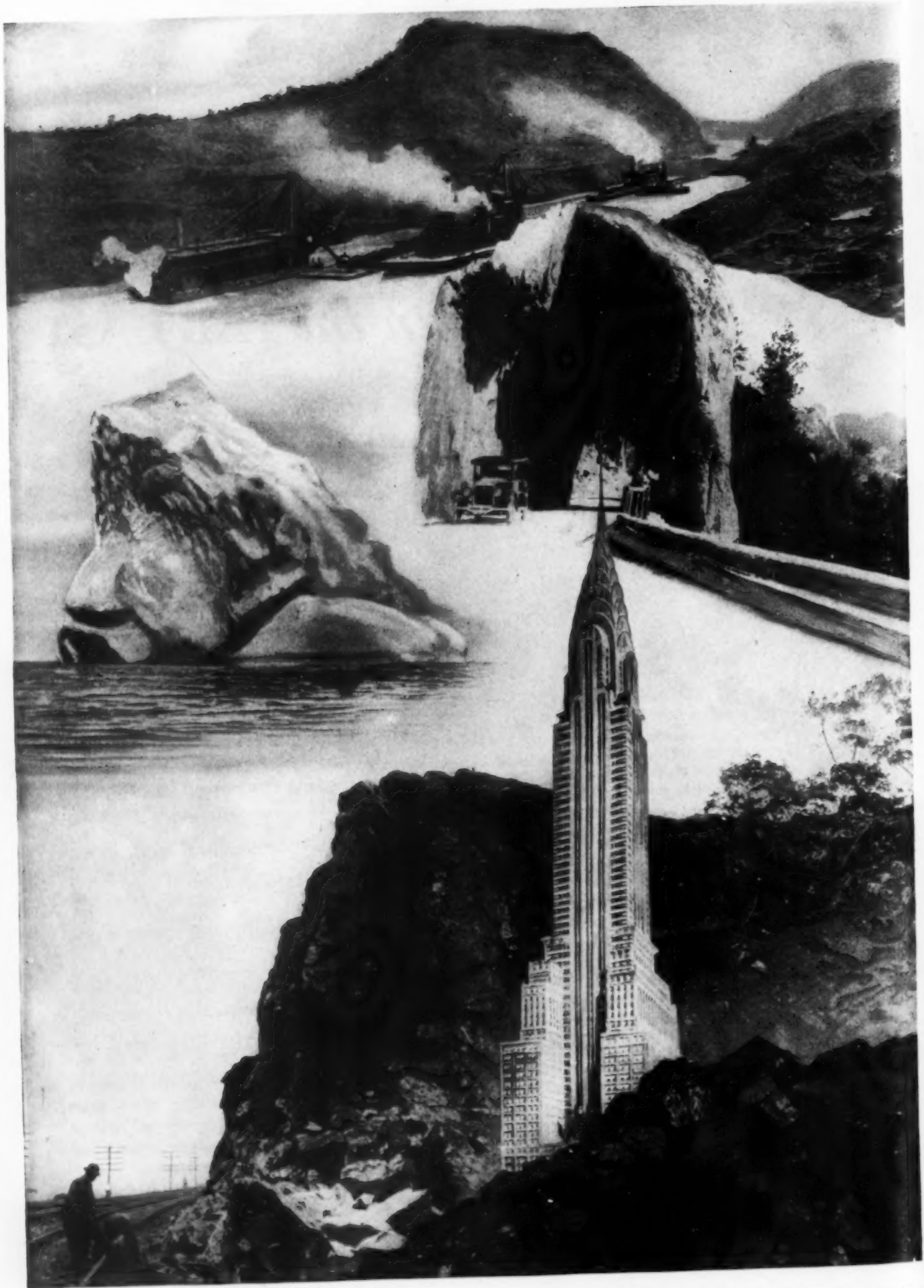
Pershing Square Building, New York

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Associated Companies Throughout the World



BUILDS · DURABLE · LOW-COST · ROADS





POWER

efficiency . . . economy

*No matter what your blasting operation,
there's a du Pont explosive
to meet your need*

In specifying explosives for different types of blasting, much depends on the kind of explosive. So when you select an explosive for a given job, you want to know these things: How well will it do the job? Has it been made especially to meet and overcome certain conditions? Is it economical to use?

These are just a few of the questions the du Pont Company has asked about explosives in the 128 years it has been making them. Every sort of blasting encountered in the United States has been studied by expert technicians so that the du Pont Company might be able to improve its own explosives . . . might be able to introduce new explosives that would more fully meet your requirements.

The fact that most of the new improvements in explosives have been

brought forward by du Pont accounts for their leadership in the field. The reason you can specify du Pont explosives with full assurance is that there is a du Pont explosive specifically designed for your job.

For coal mining . . . the du Pont Permissibles and Pellet Powders. For clay, ore, salt and gypsum mining . . . Durox, Gelex, Extras. For quarrying, for road and railroad construction . . . Gelatins, Extras. For excavating, tunneling, shaft sinking . . . the Special Gelatins. And so on.

The du Pont Company publishes a series of Technical Bulletins dealing with methods of blasting, and describing du Pont explosives. These bulletins can help you solve your blasting problems.

We shall be glad to place your name on our lists to receive these bulletins. Write direct.



E. I. DU PONT DE NEMOURS & CO., INC.
Explosives Department

Wilmington, Delaware

T. L. SMITH



For Central Mixing Plants

SAVES plant construction, equipment and operating cost because low bin height cuts "lift" of materials!

The Smith Weigh-Mix does not exceed height of standard mixer!

Weights stone, sand, cement and water, making possible standardized quality concrete!

One man easily controls all operations!

Vibrating hopper cleaner accelerates fast charging and cleans hopper to bring scales to balance! Smith high speed tilting drum discharge!

Frame easily taken down or assembled!

Smith Weigh-Mix for Central Mixing Plants 1, 1½, 2 and 3 yard capacities! Write for Smith Weigh-Mix Literature!

N. E. C. Service everywhere!

National Equipment Corporation

30th St. & Concordia Ave.
Milwaukee, Wisconsin



N. E. C. LINES

KOEHRING
Pavers, Mixers; Power Shovels,
Pull Shovels, Cranes, Draglines;
Dumpers.

INSLEY
Excavators; Concrete Placing
Equipment, Cars, Buckets,
Derricks.

T. L. SMITH
Tilting and Non-tilting Mixers,
Pavers, Weigh-Mix.

PARSONS
Trench Excavators, Backfillers.

C. H. & E.
Portable Saw Rigs, Pumps,
Hoists, Material Elevators.

KWIK-MIX
Mixers: Concrete, Plaster
and Mortar.

HALF-YARD INSLEY

No longer a question of profit and economy of
half-yarders for grading, sewers, ditching,
basements, etc.

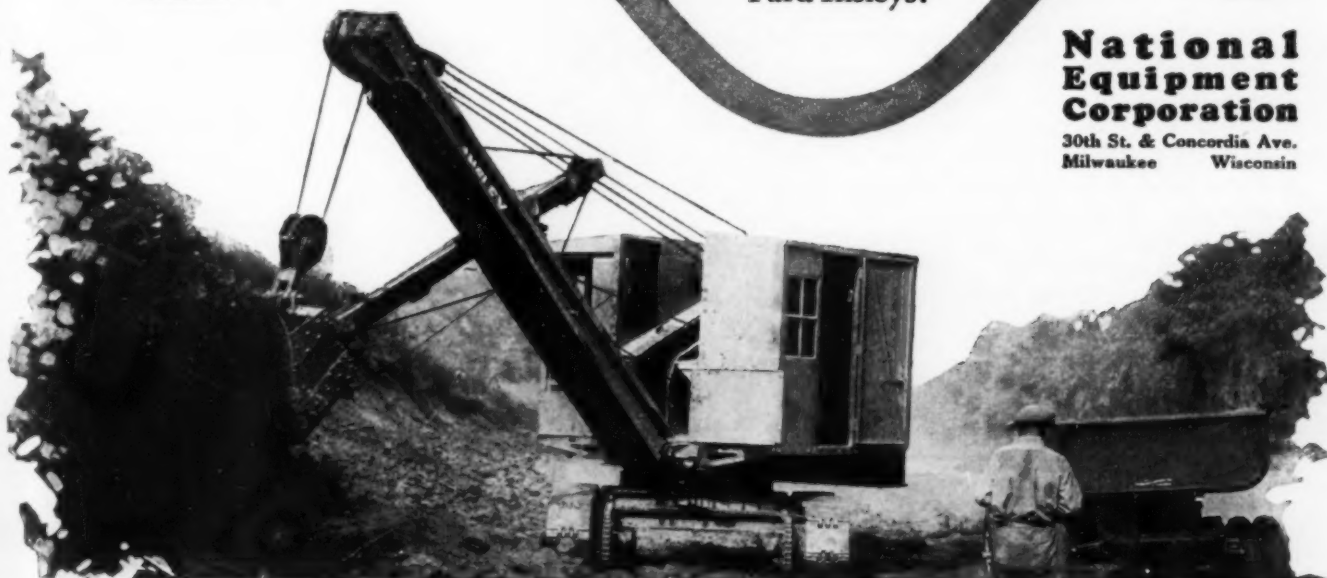
Now your greater profit possibilities are
in the *right* half-yarders!

There's where N.E.C. engineering,
Insley reliability and extra profit
performance give you greater
profit certainty. Write
us! Let us tell you all
about the Half-
Yard Insleys!



**National
Equipment
Corporation**

30th St. & Concordia Ave.
Milwaukee Wisconsin



A 5714-I



PARSONS DITCHER

Suit Bucket and Traction Speed to the Digging!

HIGH bucket speed with fast traction and conveyor speed when the digging is easy—slower bucket or slower traction, or both, when it's tough going! Two bucket speeds, four traction and two conveyor speeds make the Parsons adaptable to any sort of digging and allow full-capacity operation.

Because it's so thoroughly anti-friction in design, equipped with roller bearings, and with gears in enclosed oil bath, the Parsons delivers utmost power to the buckets where it counts most for profits! It's the *Heavy Duty Ditcher* with the patented offset boom that digs on either side within inches of curbing, etc. and spills its load to either side. 5 sizes — the right one for your job.

Write for Parsons Ditcher Catalog today.

N. E. C. PRODUCTS

KOEHRING
Pavers, Mixers; Power Shovels,
Pull Shovels, Cranes, Draglines;
Dumpers.

INSLEY
Excavators; Concrete Placing
Equipment, Cars, Buckets,
Derricks.

T. L. SMITH
Tilting and Non-tilting Mixers,
Pavers, Weigh-Mix.

PARSONS
Trench Excavators, Backfillers.

C. H. & E.
Portable Saw Rigs, Pumps,
Hoists, Material Elevators.

KWIK-MIX
Mixers: Concrete, Plaster
and Mortar.

National Equipment Corporation

30th St. & Concordia Ave.
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Continental Hose!!

Air Compressor Hose

Water Hose

Pneumatic Tool Hose

Steam Hose

Suction Hose

Pile Driving Hose

Boots and Oiled Clothing

are being used by A. Guthrie & Co., St. Paul, in their stupendous job of putting the River Des Peres, St. Louis, Mo., underground and the report is

"GOOD AND FAITHFUL SERVICE"

CONTINENTAL PRODUCTS ARE BUILT TO STAND THE GAFF

Carried in stock at all times by the branch nearest you.

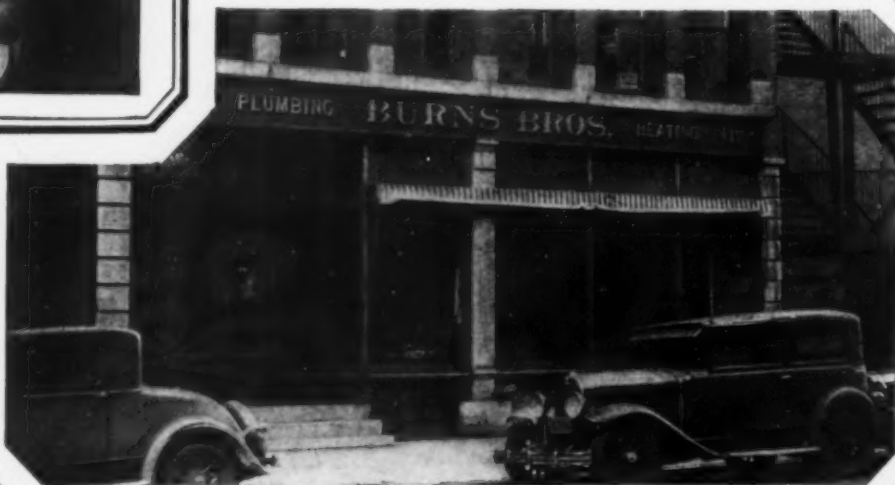
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CHICAGO, ILL.27 West Illinois St.
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Continental Rubber Works, Erie, Pa.



“Quick Turnover Prevents Deterioration



Above—Mr. Thomas H. Burns, of Burns Brothers of Syracuse, New York. This company's services are of a definite economic value to the prosperity of its business territory.

OUR stock is adapted to community requirements and takes into consideration the prospective purchases of many users in our vicinity. This means turnover and consequently a minimum of deterioration. We save consumers that risk. Rubber is one item which is affected with age. We recommend Republic's Belting—Hose—Packing—Molded and Lathe Cut Goods.”

The above statement is characteristic of those made by prominent distributors all over the country. It explains in part how the Industrial Supply Distributor, helping to solve the important problem of broad markets and economical distribution, upholds high quality, maintains fair prices and saves needless efforts on the part of both consumer and manufacturer.

**THE
REPUBLIC RUBBER CO.**
Youngstown
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For strength — lightness — flexibility — and — beauty — Fairway Water Hose stands in a class by itself. It is made in any length up to 500 feet and in any size from ½" to 1" inclusive. On orders for 100 feet or more, of a size, an additional label will be attached showing the user's name.



**REPUBLIC means
the Best Mechanical
Rubber Goods**



THE *new* WILLIAMS CHAMPION

DEFINITELY guaranteed to dig harder materials than any bucket built. You don't need any dynamite—"the Dynamite is in the Bucket."

Write us, and we'll arrange a trial—make your own comparison. A real champion welcomes competition!

**G. H. WILLIAMS
COMPANY**

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Branch Offices: New York,
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21 IMPROVEMENTS
give Extra Digging Power to the
New WILLIAMS "Champion"



WILLIAMS

BUCKETS-TRAILERS



TRADITION

"Here, Lad—

It beats all how welded steel design is getting into all sorts of machinery.

Every piece of equipment we've bought this year has been steel construction—and proved good.

Why not make it a cast iron rule to buy only welded steel equipment?"



"Linc-Weld" Superiority is due to:
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 2. Larger Bearings
 3. Better Insulation
 4. Stronger Frame (Steel)
 5. Greater Overload Capacity

"Fine, Pop—

but make it a STEEL rule.

It's less easily broken.

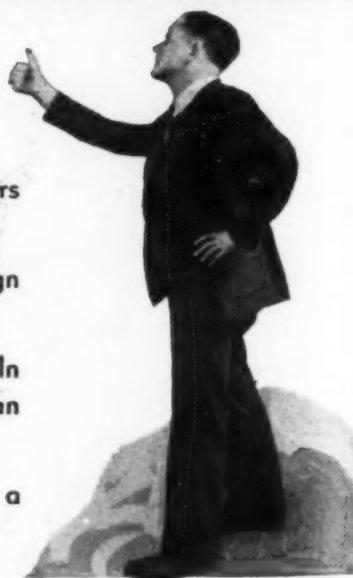
And what is most important, let's put the motors we buy in that class.

The Lincoln 'Linc-Weld' motor is all steel design—modern—better.

This steel construction has given the Lincoln people a chance to give us more in a motor than is possible with cast construction.

The improvements are plentiful as pins in a new shirt."

PROGRESS

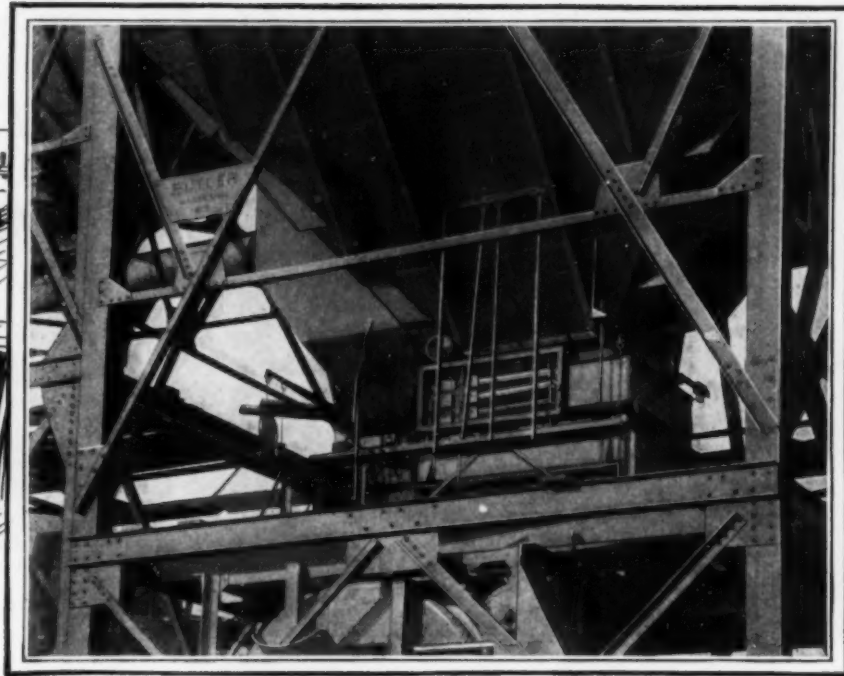


THE LINCOLN ELECTRIC COMPANY
 Department No. 32-6 CLEVELAND, OHIO

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LINCOLN
"LINC-WELD" MOTORS

CONTROL!

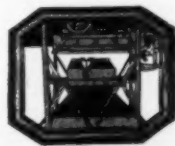


BUTLER Commercial Concrete Plants are built for speedy operation. One operator—with his controls banked within easy reach—easily weighs—and discharges into the mixer—the cement, aggregates and water for any batch requirement. In central mixing plants he also controls the mixer.

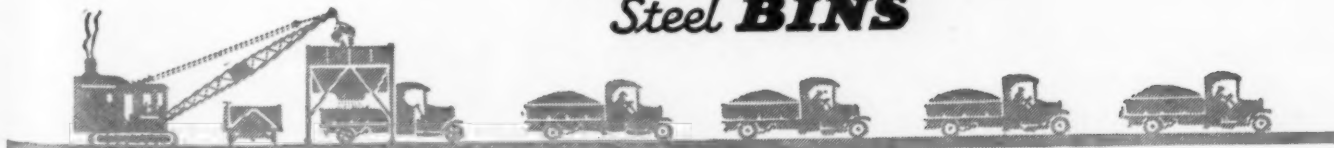
There is no lost motion, no lost time. The control is as positive and accurate as the control of railroad traffic from a switchman's tower. Butler Commercial Concrete Plants are built for either central mixing method or for mixed-in-transit method—either end-or-top-loading.

Since the best results can only be obtained if your plant is built to take advantage of natural conditions, avail yourself of Butler engineering experience in commercial concrete plant construction before deciding on a plant.

BUTLER BIN COMPANY, Waukesha, Wisconsin
Representatives in fifty cities.



BUTLER
Steel BINS



THE ARCHITECTS' VERDICT:

"Plaster needs STEEL REINFORCEMENT like reinforced Concrete in Principle"



The walls and ceilings of this artistic residence are lathed with **RIBBED STEELTEX** . . . the interior plaster is steel-reinforced for lifetime permanency.

* MERIT CHART	Ribbed STEELTEX for Plaster
Reinforcing	✓
Insulation	✓
Sound deadening	✓
Automatic back-plastering	✓
Adds structural value	✓
Added security over suction or plaster keys	✓
Angle reinforcement at no added cost	✓
Assurance of having proper and uniform thickness of plaster	✓
Prevents lath marks from showing on finished plaster	✓
Crack prevention	✓

The Merit chart above shows the ten results you **MUST** get with a plaster lath to obtain the **RIGHT** job. Ribbed **STEELTEX** lath gives **ALL** ten results.

Ribbed **STEELTEX** is the easiest handled lath on the market . . . and comes in sheets, neatly packed in bundles, ready for application. Ribbed **STEELTEX** lath is quickly and easily applied and when plastered becomes a one-piece, solid **STEEL-REINFORCED** plaster slab . . . like reinforced concrete in principle.

RIBBED STEELTEX applies easily



Every room blanketed with heavy backing of **STEELTEX** . . . insulates against heat & cold . . . deadens sound

Write for the **COMPLETE** merit chart showing Ribbed **STEELTEX** lath in **COMPARISON** with **OTHER** types of plaster lath . . . it's **FREE** . . . get this interesting **LATH COMPARISON CHART** . . . address Dept. 65-E.

RIBBED STEELTEX LATH REINFORCES PLASTER WITH EMBEDDED STEEL . . . *does it Automatically*

Thousands of leading architects realize the value of **STEEL REINFORCEMENT** in plaster,—that's their verdict. But that is not all . . . there are other essentials, too. In fact, to obtain a permanent, quality plastering job, the plaster lath for interior walls and ceilings **MUST** give all **TEN (10)** results as indicated in the ***MERIT CHART** (at left, below).

Any plaster lath will give **SOME** of these ten results,—Ribbed **STEELTEX** lath for interior plaster gives **ALL** ten results . . . in a desirable and satisfactory manner. **WHY COMPROMISE?** Use Ribbed **STEELTEX** lath for interior plaster,—it is now suitable, economical and practical for every type of home or building . . . whether a costly mansion or humble cottage.

RIBBED STEELTEX minimizes plaster cracking hazards



Plaster flows under and around welded steel wires

The reinforcement of Ribbed **STEELTEX** lath is composed of a network of cold-drawn, electrically-welded steel wire (heavily galvanized). This steel mesh is securely woven onto a tough, pure-fibrous backing. Across the back of every **STEELTEX** sheet are rows of V-shaped metal **RIB STIFFENERS** . . . insuring board-like rigidity.

The National Steel Fabric Company are the world's largest manufacturers of **Welded Steel Fabric** (wire mesh reinforcing) for concrete, plaster and gypsum. **STEELTEX** . . . There are four styles of **STEELTEX**, as follows:—Ribbed **STEELTEX** lath for interior plaster,—**STEELTEX** for stucco,—**STEELTEX** for brick and stone veneer,—**STEELTEX** for floors and roofs (concrete and gypsum).

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NATIONAL STEEL FABRIC COMPANY

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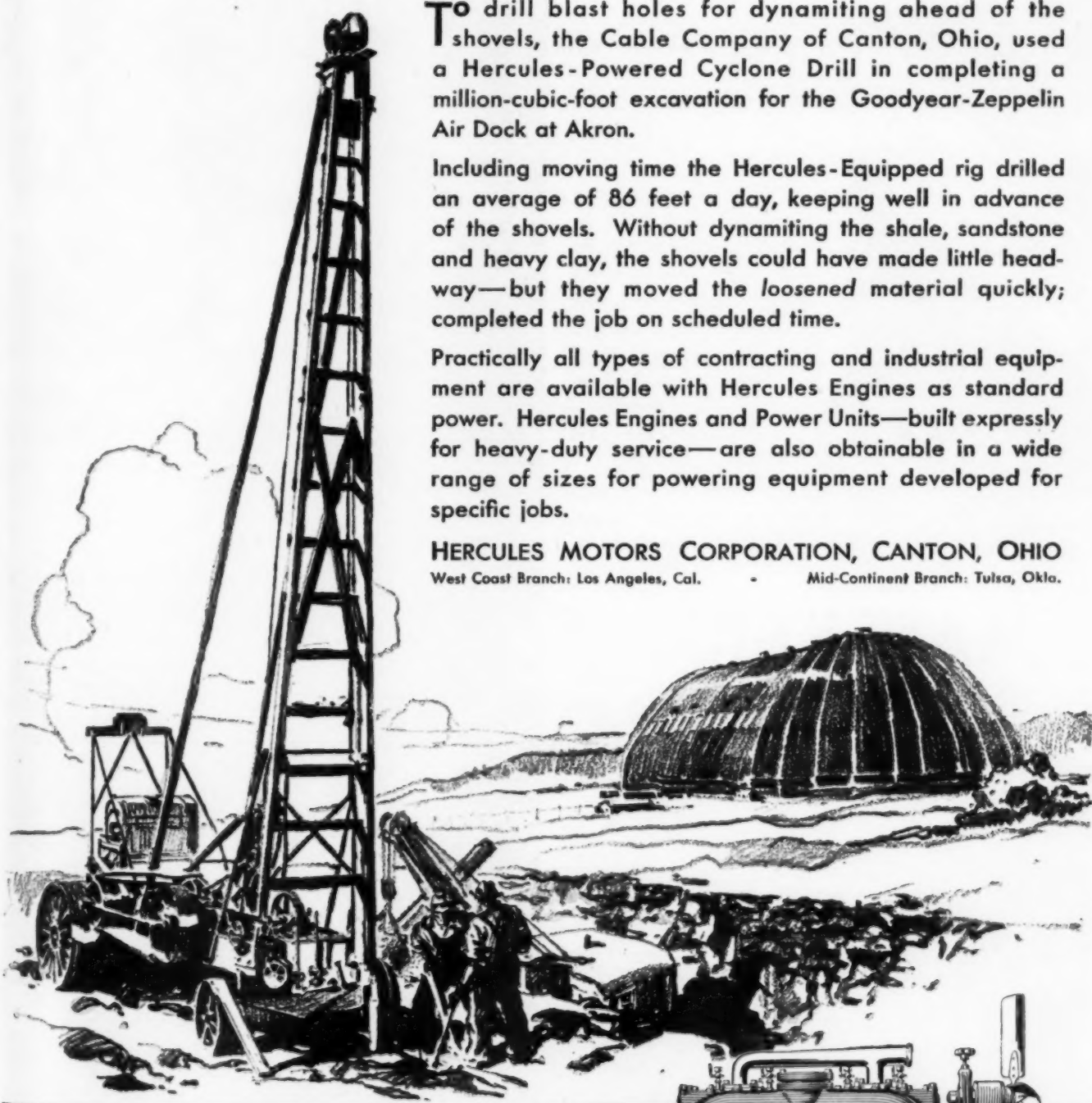
Including moving time the Hercules-Equipped rig drilled an average of 86 feet a day, keeping well in advance of the shovels. Without dynamiting the shale, sandstone and heavy clay, the shovels could have made little headway—but they moved the loosened material quickly; completed the job on scheduled time.

Practically all types of contracting and industrial equipment are available with Hercules Engines as standard power. Hercules Engines and Power Units—built expressly for heavy-duty service—are also obtainable in a wide range of sizes for powering equipment developed for specific jobs.

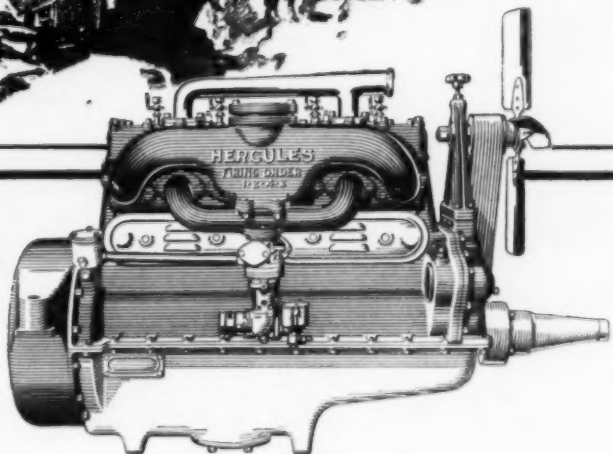
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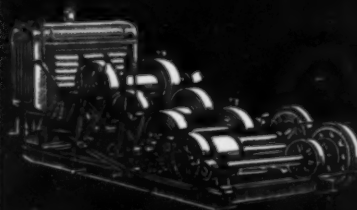
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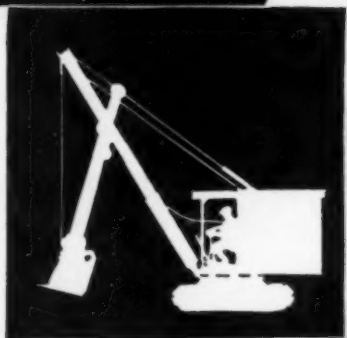
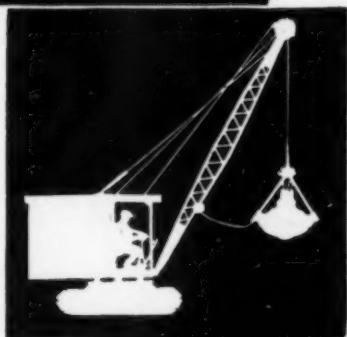
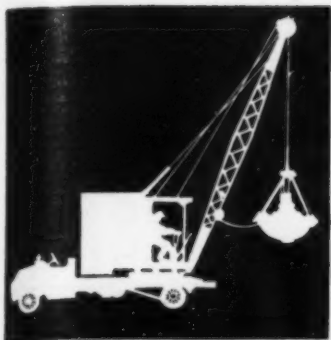
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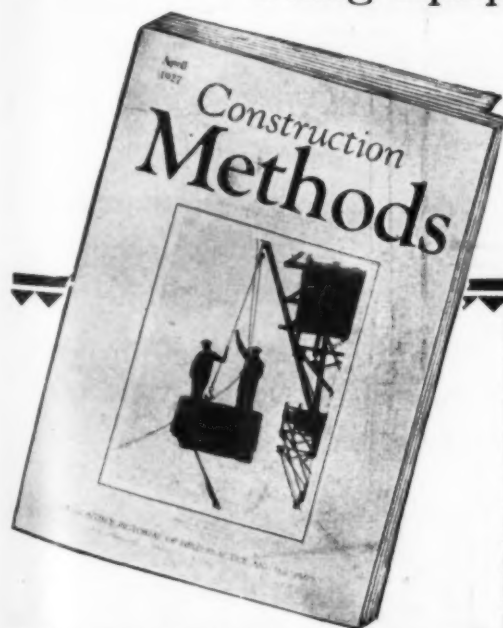
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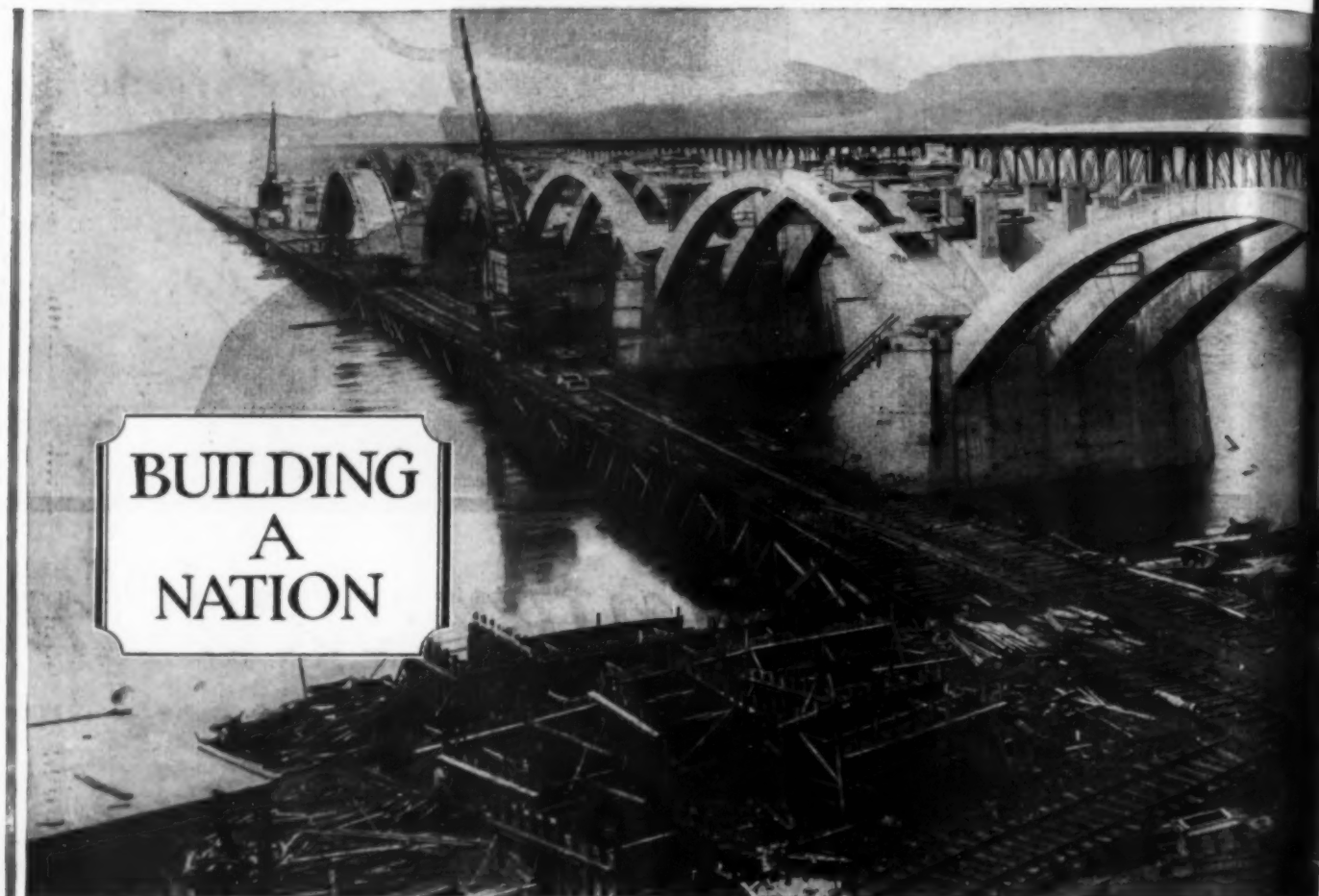
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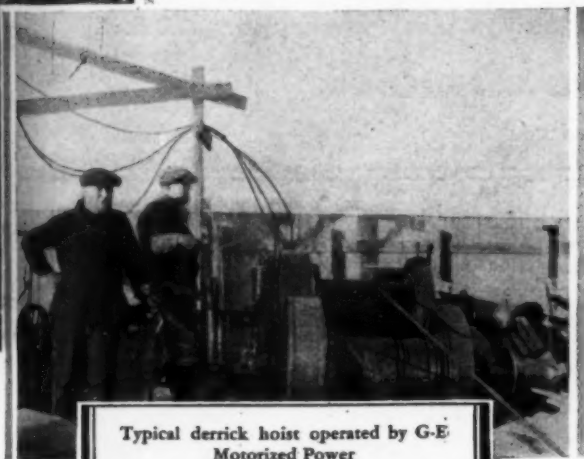
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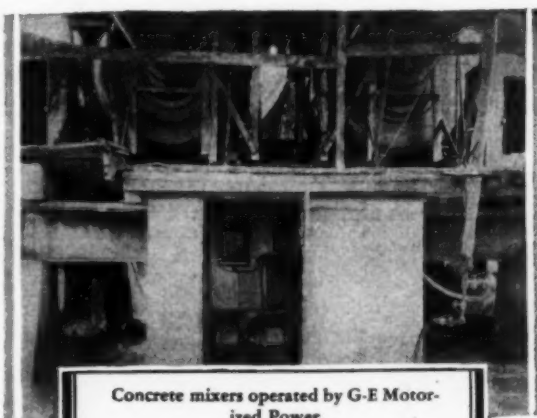
THE bridge builder—what a debt the nation owes him! Shrinking miles and stretching minutes, he scales the Titan barriers of nature that oppose the progress of man and his commerce.

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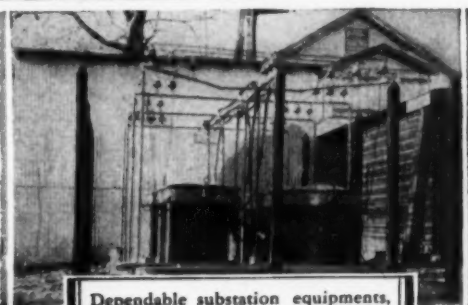
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Concrete mixers operated by G-E Motorized Power



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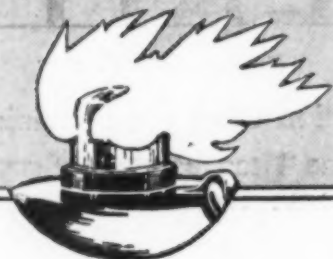


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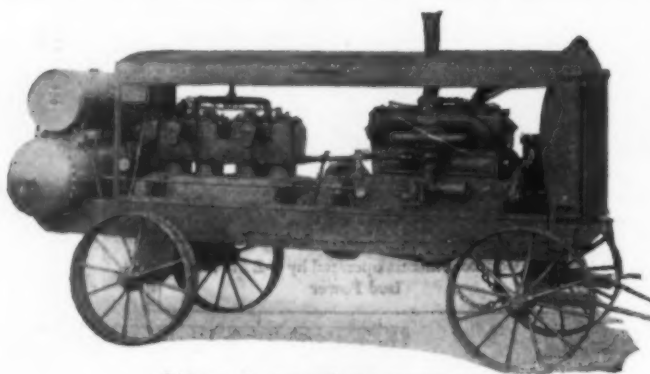
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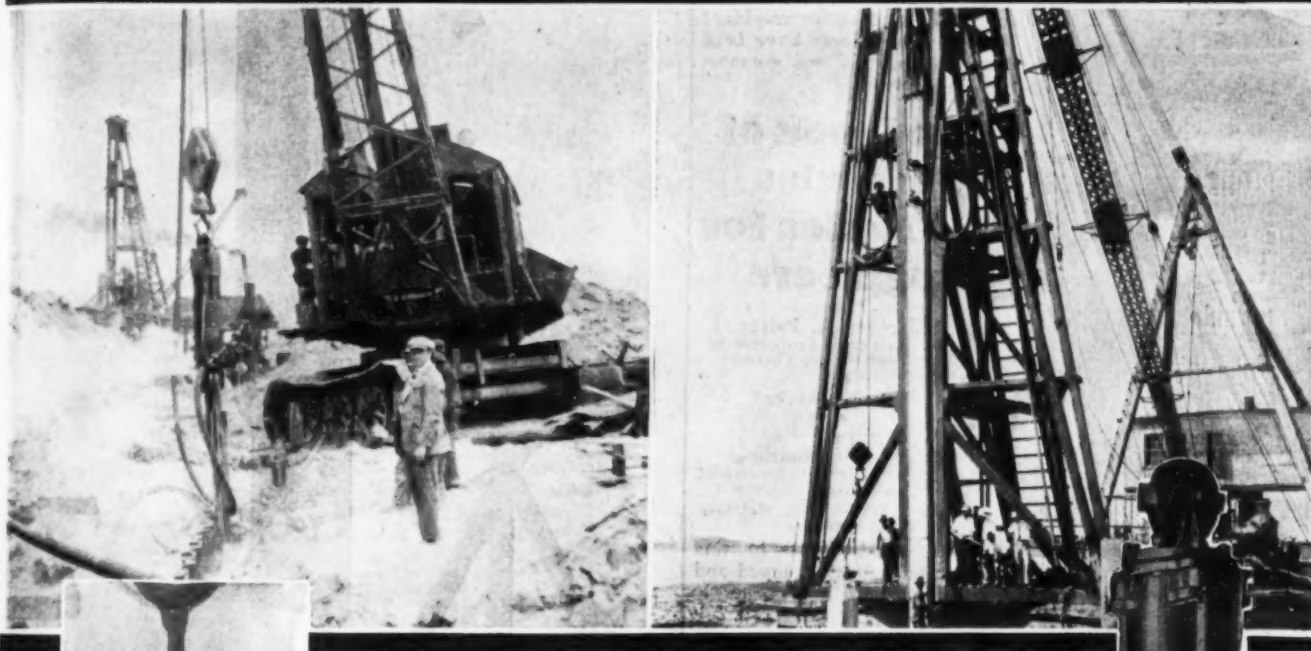
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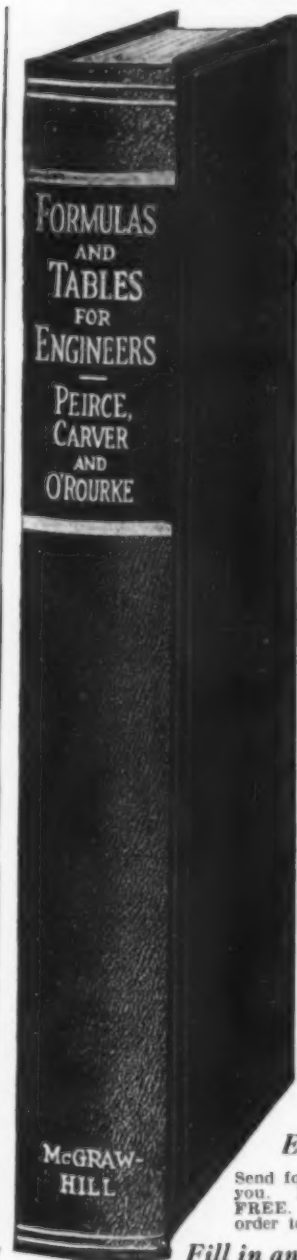
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October 18, 1929.

JAMES N. GOI
PRESIDENT AND GENERAL MANAGER

Newport Culvert Company,
Newport, Kentucky.

Gentlemen: In 1909, 1910 and 1911, as Secretary and Purchasing Agent of the General Road Commission of Putnam County, Kentucky, our culverts from the Newport Culvert Company of Newport, Kentucky, and at that time same was known as the Genuine Open Hearth Iron guaranteed to last indefinitely, and after twenty years of use, I have today in company with others, examined some of these culverts that are still in use and found same to be almost in perfect condition. A section of one of the culverts was removed in my presence and upon inspection it is free from rust and seemingly good for years and years to come.

In 1916, seven years after the work had been done, I was in company with some parties who made an examination at that time and testified to their condition, and at this date, twenty years after they were installed, I find the same culverts examined at that time in use and seemingly in as good condition as they were upon that date.

A commercial photographer is today photographing a 30 inch culvert on the old Spring Creek road known as the Harve Terry Road, and this is one of the culverts that I referred to above as being in almost perfect condition and seemingly with no deterioration after twenty years of use.

Yours truly,

James N. Goi



Above — GOHI Corrugated Culvert installed in Putnam County, Tenn., in 1909. The almost perfect condition of this culvert, after twenty years in the ground, indicates a certainty of service of several times twenty years.



(Meet all copper-bearing pure iron requirements in all accepted specifications for corrugated metal culverts.)

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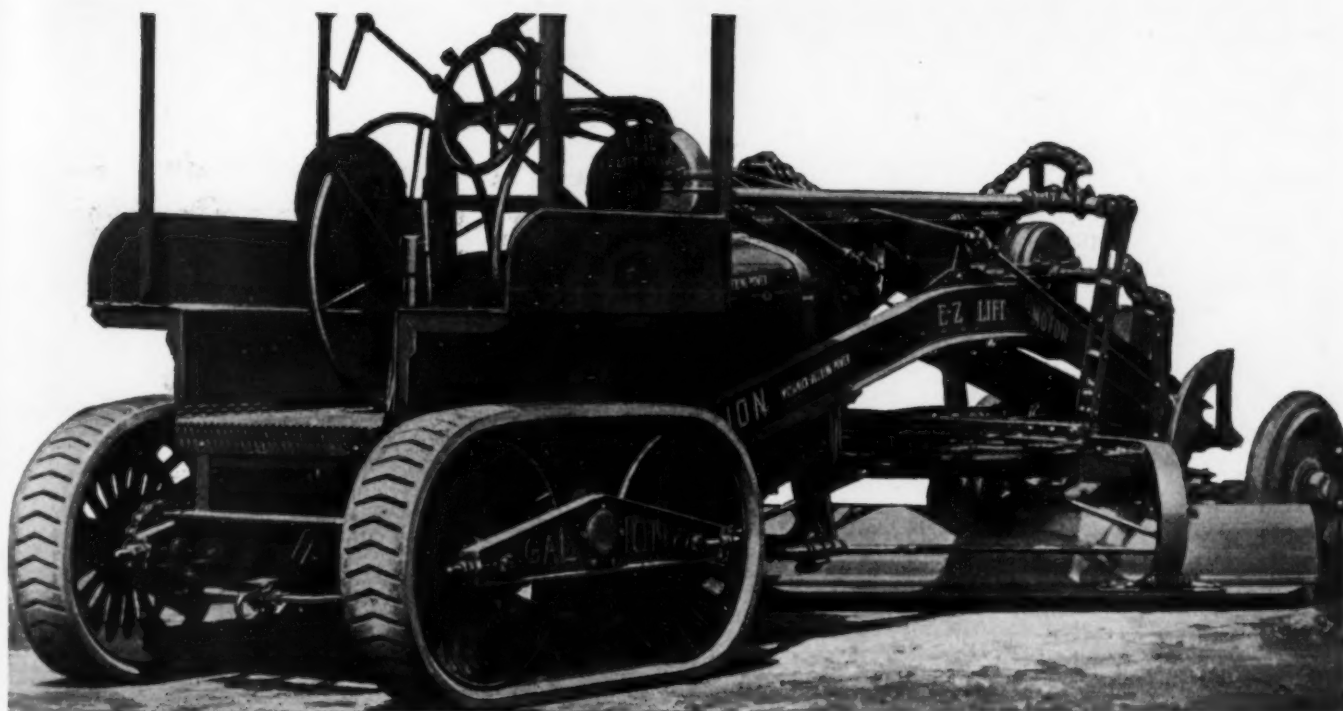
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Virginia Road Machy Co., Richmond, Va.
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Again Galion sets the pace with another new development in Motor Grader construction, the Galion Sure-Trac Rubber Crawler. A few of its outstanding advantages are: smooth continuous track with positive traction under all working conditions --- greater operating economy --- less vibration --- higher speed and guaranteed mileage.

Objectionable features found in steel crawlers are eliminated entirely. Sand, which sets up a grinding action between the sprockets and steel plates of metal crawlers, causing great wear, does not affect the rubber crawler, as there are no links or sprocket teeth.

Destructive vibration, caused by flopping action of the metal links or plates as they lay themselves on the ground, is replaced by the smooth, cushioned surface of the rubber track. Gripping action of rubber easily carries the crawler over large stones or rough soil and the drop is made without shock to the machine.

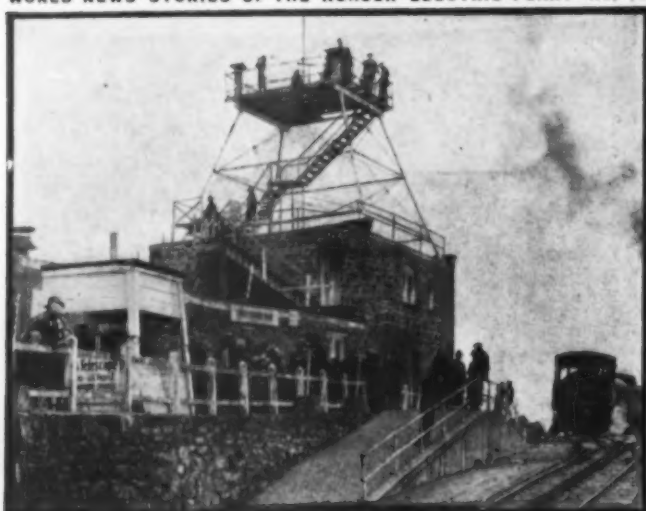
A higher operating speed of the tractor may be maintained---rubber track is designed and constructed to stand up under a much higher speed than any steel crawler ever designed.

More detailed information on the Galion McCormick-Deering E-Z Lift Motor Grader will be sent on request.



The Galion Iron Works & Mfg. Co.

Galion - - - - - Ohio



Summit House, Pike's Peak, Colorado

on top of the world

THE shelter house of Pike's Peak Summit is over 14,000 feet above the sea . . . surrounded by a mountain wilderness . . . miles from electric power lines. Yet night after night its searchlight plays over the surrounding Rockies, peering into the darkness, visible even on the distant plains.

On top of the world! Yet caretakers and tourists who come to Pike's Peak enjoy the comfort and convenience of the latest things electrical. The same Kohler Electric Plant which lights up the mountain beacon provides reliable electric current for the use of visitors and habitants. Running silently smooth, its motor serves as the power house providing the summit with modern electricity.

Kohler Electric Plants supply dependable electric current—direct or alternating—for scores of dredging, excavating, building and engineering jobs. They're compact, rugged and reliable. In industrial plants, lumber camps, on trains or trucks, at oil wells—wherever constant or emergency electric current is needed. No other unit is so efficient.

Kohler plants are sturdy and compact—readily portable over rough country. No large storage batteries are required. Fueled by gasoline, natural or artificial gas. Capacities from 800 watts to 10 K.W.

Operation of a Kohler Electric Plant is as simple as running an automobile. The motor starts automatically and runs only when light or power is turned on.

Send coupon for complete information TODAY. . . Kohler Company. Founded 1873. Kohler, Wis.—Shipping Point, Sheboygan, Wis.—Branches in principal cities. . . Manufacturers of Kohler Plumbing Fixtures.

KOHLER OF KOHLER ELECTRIC PLANTS

KOHLER CO., Kohler, Wisconsin

CM-6-30

Gentlemen:

Please send catalog describing Kohler Electric Plants.

Name _____ Street _____

City _____ State _____

Use in which interested _____



**LOWELL
REVERSIBLE
RATCHET
WRENCHES**

On the Job

with the

**Manitowoc
Shipbuilding Co.**

It takes a lot of long hard pulls to drive that nut home.

That's why this company uses Lowell Reversible Ratchet Wrenches on this job. With Lowells, the men just *pump* back and forth 'til the nut is tight. No stops for re-fitting the wrench to the nut. No lost time! Every minute is spent in useful work and shows a profit.

And shipbuilding isn't the only field. Wherever wrench action is suitable driving power, there you will find Lowells.

Catalog "R" will show you a wrench for the job you've got in mind—write for it.

**LOWELL WRENCH
COMPANY**

WORCESTER,

MASS.



Full loads *with* "Caterpillar" Tractors



Plenty of power—the sure traction that conquers sand and mud—positive steering—*thus are full loads assured to the earth mover**. Wide "Caterpillar" tracks bridge soft spots and wet—they worry about the weather not at all! So are jobs completed in record time—so is the owner of "Caterpillar" equipment able to handle a greater number of jobs at greater profits!

Prices—f. o. b. Peoria, Illinois			
TEN	\$1100	TWENTY	\$1900
FIFTEEN . .	\$1450	THIRTY	\$2375
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Caterpillar Tractor Co.

PEORIA, ILL., and SAN LEANDRO, CALIF., U.S.A.
Track-type Tractors / Combines / Road Machinery
(There is a "Caterpillar" Dealer Near You)

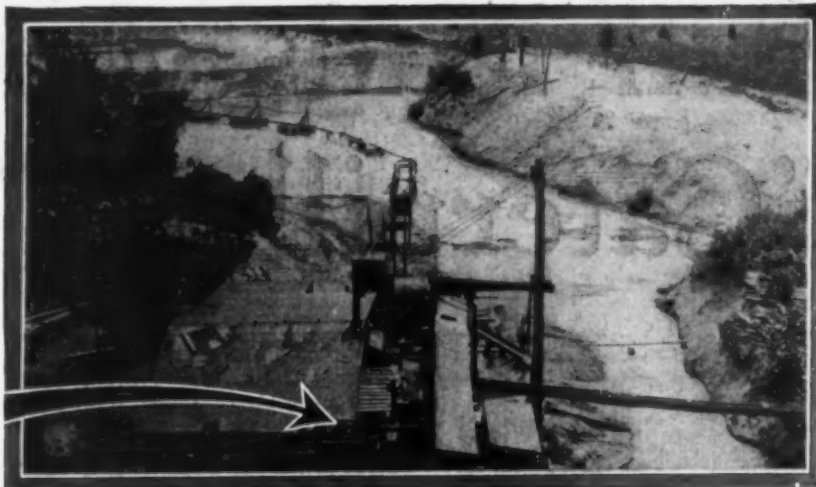
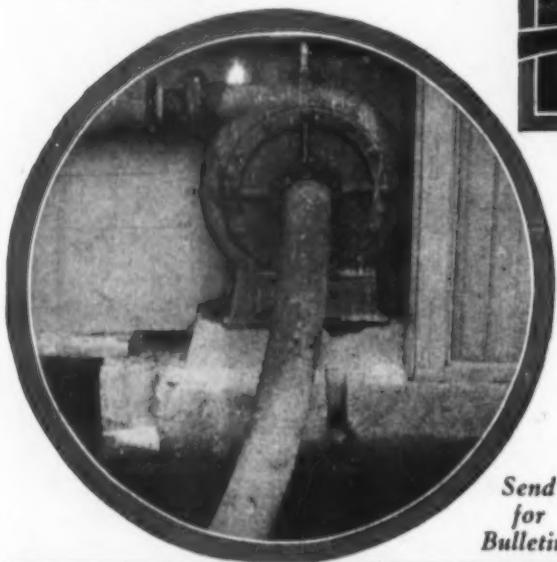
CATERPILLAR
REG. U. S. PAT. OFF.
T R A C T O R

*The picture shows a "Caterpillar" being used to enlarge the airport at Long Beach, California.

MORRIS

CENTRIFUGAL PUMPS

for
booster
service—



one of the many Morris Pump applications

AT THE J. B. Drinker & Company Plant in South Vineland, New Jersey, a Morris Centrifugal Pump is serving as a booster to lift 30 to 40 tons of sand and water per hour through 110 feet of pipe to an elevation of 55 feet above the pump. This is but one service among many in and about sand and gravel producing plants or quarries where Morris Centrifugal Pumps have

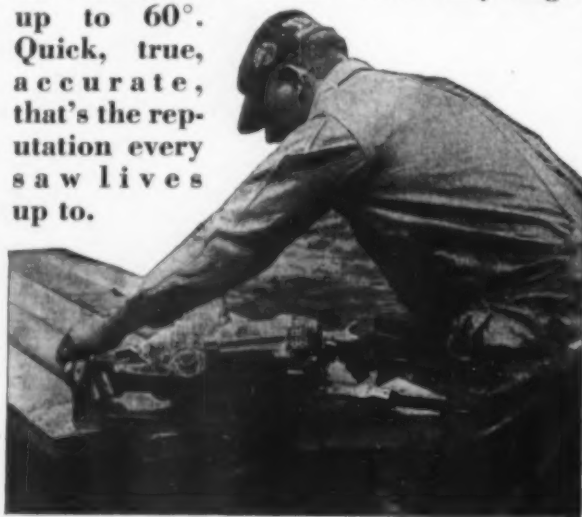
proven their ability to help increase production or improve plant operation. For hydraulicking, dredging, unwatering, general service or special process work—wherever clear water or water containing abrasive or corrosive solids is to be conveyed, the many types of Morris Centrifugal Pumps provide an exactly suitable selection to assure efficient, dependable and low cost operation.

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Branches in principal cities.

With a WAPPAT it's easy

to make jackrafter cuts. WAPPAT Electric Handsaws can be set to any angle up to 60°. Quick, true, accurate, that's the reputation every saw lives up to.



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WAPPAT
INCORPORATED

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Pittsburgh, Pa.

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LIFTS . . . SWINGS . . . CARRIES . . . HAULS

Sturdy, mobile, compact, the Loadmaster is an invaluable asset in the hoisting and transporting of moderately heavy loads. It can maneuver easily in confined areas. The swinging boom, requiring no stiff-legs for side lifts, makes simple the "spotting" of loads. With the additional feature of being able to haul, the Loadmaster can accommodate trailers, etc., even while carrying a load itself in suspension. Send for catalog.

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342 Madison Ave., New York City

LOADMASTER
SWING-CRANE

FROM GROUND-LINE . . . TO SKY-LINE—STERLING WHEELBARROWS

Sterling

WHEELBARROWS

were chosen as the
No. 1 Wheelbarrow for
Chicago's No. 1 La
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In bringing this impos-
ing 48-story building,
from the ground-line to
the peak of Chicago's
sky-line—JOHN
GRIFFITHS & SON
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Contractors—purchased
Sterling Wheelbarrows,
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tired wheels. A signif-
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high-speed efficiency
and it's contribution
to lowered operating
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STERLING ON A WHEELBARROW MEANS MORE THAN STERLING ON SILVER

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BRANCH WAREHOUSES—BOSTON, NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, DETROIT, CHICAGO, ST. LOUIS



BIGGS Welded Steel Pipe

To the Engineer Specifying Pipe—

Biggs Electrically Welded Steel Pipe, 30-in. to 96-in. diameter, offers you maximum structural strength, 100% joint efficiency, a smooth interior, a virtual absence of maintenance, complete uniformity and dependability. It assures you a safe, permanent, efficient, and economical pipe line, especially adapted to severe operating conditions. The Biggs Weld is stronger than the plate itself, proved so by hydrostatic, tension, torsion, and bend tests impossible with any other type of conduit.

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Biggs anticipates and avoids installation expense and trouble by proper shop fabrication. Biggs Welded Steel Pipe fits together with a minimum of labor. Field testing goes off without a hitch. You will have no laps or lock bars to sledge down. Joints come at the most convenient points. All that Biggs does bears the earmarks of long acquaintance with actual conditions. If the contractor desires, Biggs will take full charge of or supervise the pipe laying job.

Biggs Builds—

Welded Steel Pipe	Tunnel Shields
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New York

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Typical day's production of Biggs electrically welded steel pipe, being part of a 35,000-foot job of 72-in. pipe line for Detroit, together with 30-in. and 48-in. sizes for Kansas City, Mo. and River Raisin Paper Co., Monroe, Mich.

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BAKER MANEY Self Loading Scrapers

Continually improved, Baker Maney's are foremost in the minds of those who use only dependable earth movers. So it is with every piece of Baker Tractor Equipment.

Write for these Bulletins:

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Baker Rotary Scrapers ☐
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Co.

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Springfield, Ill.



A WARCO Job in York County, Pennsylvania

Mr. Linn Nell, Contractor of New Cumberland, Pa., relocating a township road in Newberry Township, York County, Pennsylvania.

The flexibility of his WARCO Model "E" power grader is well demonstrated in the picture.

A WARCO power grader is a good thing to have on any road job—either construction or maintenance.

W. A. RIDDELL COMPANY

BUCYRUS OHIO

Power Graders—Wheeled Scoops—Rear-Type Crawlers

Repeat Orders

from Satisfied Customers place the
Highest Stamp of Approval on the

MULTI FOOTE PAVER



Result of 26 years of Constructive Engineering

Built by Specialists in the Paving Mixer Industry for the most severe tests of Road Paving.

Dependable for Mile-after-Mile, Day-after-Day, Steady, Uniform Service.

Become a MultiFoote User—Understand why many of the largest and most successful Contractors continue to buy MultiFootes.

Refinements, without sacrificing strength;
Strength, without accumulating weight;
Mechanical Operations, without complicated mechanism.
Simple, but complete in every detail.

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THE POWER BOOM SWING—This new equipment speeds the handling of each batch and so gains yardage each day.

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HERCULES HEAVY DUTY GASOLINE ENGINE—It handles all operations with ample power.

THE FOOTE COMPANY, Inc.
NUNDA, N. Y.

World's Largest Exclusive Builders of Road Pavers

"DOMESTIC" PUMPS for CONTRACTORS

Their Use Means SAFETY SPEED and PROFITS

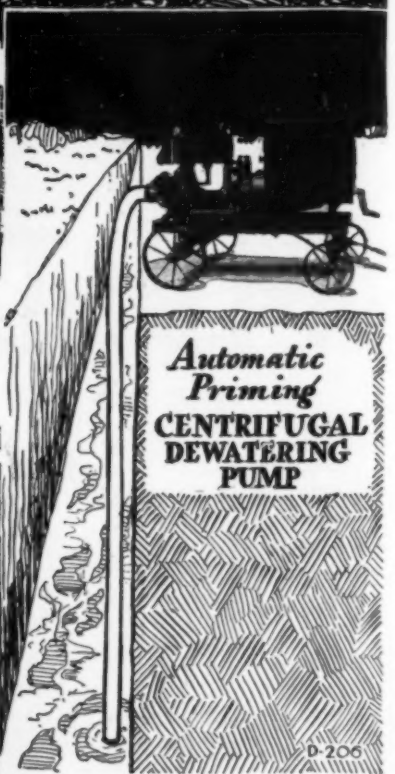


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Types: Simplex, Duplex, Triplex,
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**Automatic
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The Foremost Magneto
for **SHOVELS, MIXERS
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ENCLOSED FIND ONE DOLLAR
ENTER MY 1-YEAR SUBSCRIPTION TO
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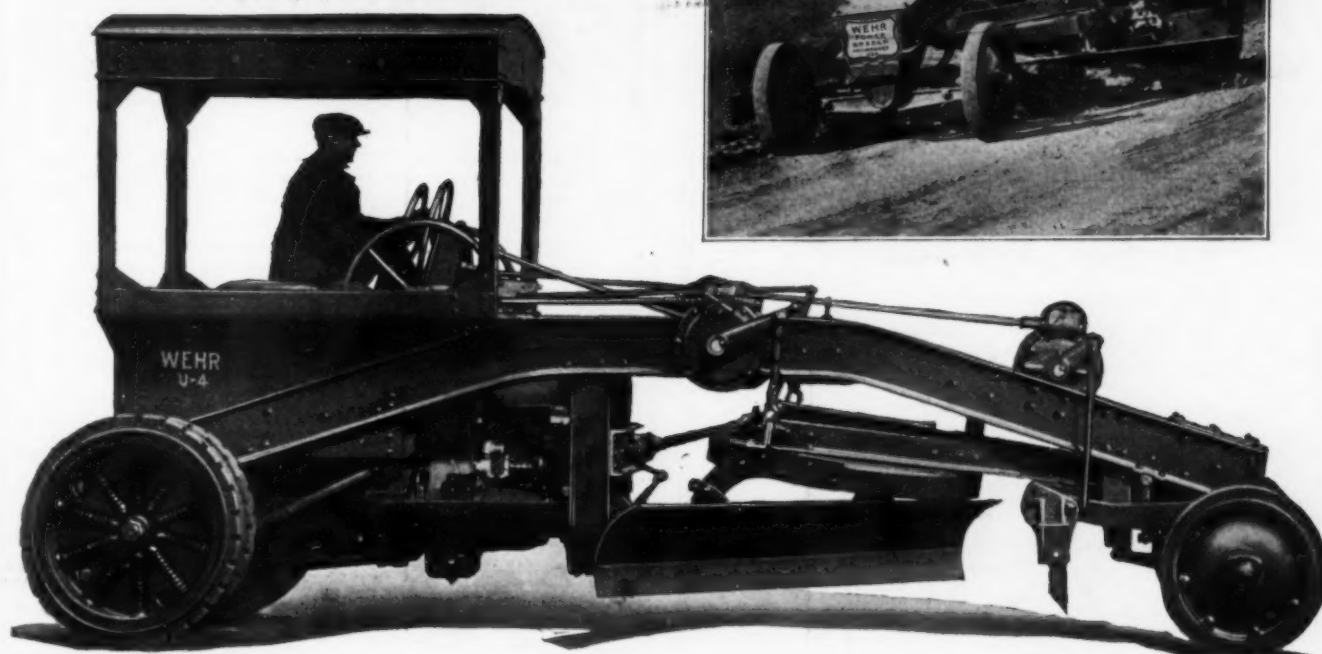
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We all know him. He doesn't
mean to bother you. He really
means it when he says he'll return
your copy.

But you know that, for some rea-
son or other, he seldom does.

Give this man the coupon - - - ,
Tell him for \$1, he can get his
own copy each month for the next
one year.

HERE . . . the last word in Power Graders!



the Improved WEHR U-4 Grader

Always a great performer on road maintenance, the Wehr U-4 is now made even more capable and efficient!

All the major and minor improvements on the new U-4 have been tested in the field, under the heaviest working conditions and most terrific strains. These tests have conclusively proved that the U-4 will stand up perfectly in *any kind of service*, and *stay new* with very little attention. Even after six months of severe punishment, these improved U-4 machines are absolutely tight at every bolt and rivet. With a new coat of paint, they stand as close an inspection as a new machine.

Here are a few of the many improvements: new mouldboard with special bulb angle reinforcer, giving maximum stiffness; worm gears have double the former amount of stock at hub; all connected parts receiving heavy stress are riveted or welded; new circle lock pin guide with double the wearing surface; larger cab to give operator complete view of all operations; and many others!

Get the full details of this famous Wehr Grader. It offers many advantages that assure the efficient and economical maintenance of good roads. Write today!

WEHR CO., MILWAUKEE, WIS.

Factory: CUDAHY, WIS.

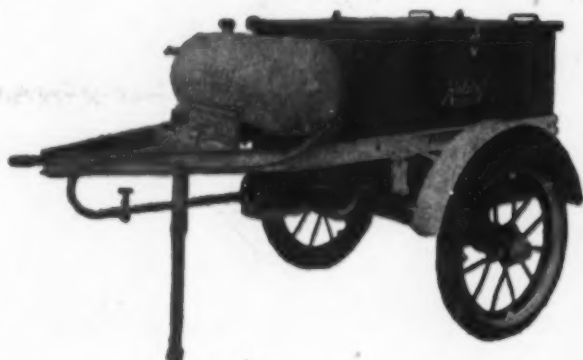
WEHR

ROAD BUILDING AND
MAINTENANCE EQUIPMENT

Hotstuf

TRADE MARK

**Melts 5,000 pounds
in 8 hours...**



That's exactly what the 50-gallon HOTSTUF Heater will do. In fact, many users have exceeded our melting capacity claims for the 50, 75 and 100 gallon HOTSTUF Heaters. The remarkable performance of HOTSTUF Heaters means more work and greater profits from every job.



Model "C" above is the Combination Tool and Asphalt Heater. Produces hot tools and hot asphalt in 5 minutes from a cold start. Heats 16 tools or more at once. HOTSTUF is the only Heater with the patented elevated melting chamber. This exclusive heating principle eliminates coking and the burning out of bottoms.



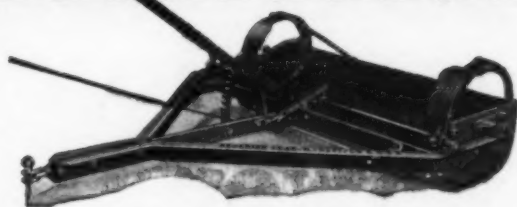
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Asphalt Heater Co.**

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BUILT TO STAND THE GAFF



The "GROUNDHOG"

Revolving Tractor Scraper

Does the Kind of Work

That Makes the Job

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For

Road Grading—Municipal Air Port Construction—Golf Course Building—Real Estate Developments—Excavating Work—Parks—Fills—and General Leveling Operations.

Works fast—the depth of cut is always under control—loads and spreads—or dumps, under forward draft. The ideal equipment for the busy contractor.

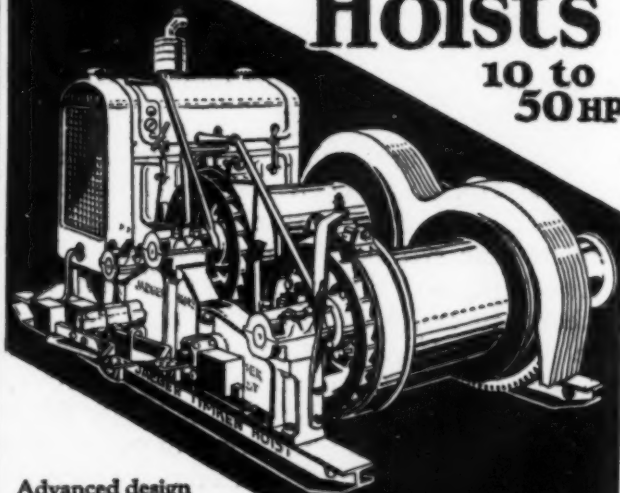
No.	Width	Capacity
4A	4 ft.	3/5 yd.
5A	5 ft.	3/4 yd.
5B	5 ft.	1 yd.

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**Jaeger Timken
Screw Thrust
Hoists**

**10 to
50 HP**



Advanced design throughout—positive drum release, (no springs), moulded asbestos friction blocks, silent chain drive, etc. Single or double, gas or electric. New low prices. Send for catalog.

THE JAEGER MACHINE CO.
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\$600

buys double drum, 4 cyl. eng. SPEED BOY—Get our other prices!

AGAIN

ROGERS SETS A NEW STANDARD

with a

STRONGER-LIGHTER TRAILER

No form of trailer construction yet devised has equalled in strength-per-pound-of-material, the Rogers Goose-neck and H-Beam frame design.

Now, by the use of a lighter alloy steel, 50% stronger than structural, Rogers Brothers have set a new high standard in producing a trailer of *reduced weight*, yet with the same unequalled strength and factor of safety.

In addition, the new compact design of the Rogers Rocking Axle Housing with its shorter axles makes possible *more tire-surface per foot of trailer-width than on any other trailer made*. This means a *narrower* trailer than ever before, with the same amount of rubber to distribute the load over the road, or *more* rubber in any desired width of trailer.

New electric steel wheels, lighter and stronger, also help to reduce the dead weight, while the special spoke design centers the load directly onto the over-size, mill-type Timken Bearings.

These features are now incorporated, *with no increase in price*, in every model from the 7½ to the 80 ton.

Combining these with the distinctive Rogers design, which has not been altered, the Rogers can truly be said to set a new world's standard in heavy duty trailers even farther than ever before in advance of all competition.

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World's  *Standard*
HEAVY DUTY
TRAILERS



ROGERS BROTHERS CORPORATION
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Saving is a good habit, BUT— Why Save Things You'll Never Use?

Undoubtedly you have some equipment which you will never use again. It is still in good, serviceable condition—it ought to be working for someone, instead of lying idle. Have you ever given thought to the fact that this equipment can be turned into CASH?

If the equipment is in good condition there is a market for it. Tell prospective buyers everywhere what you have to sell. You can reach the largest number at small cost through an advertisement in the Searchlight Section of CONSTRUCTION METHODS.

If there is something you want to sell—a crane, a patent, a complete business—just write a letter today to the Searchlight Department.

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Story
Ever Told**



Before you buy any mixer, check through this Rex Catalog on the Rex 5-S, 7-S and 10-S. It shows you all the things which Rex gives you for your money. It shows you what a modern mixer should be and do, if it is to equal the greatest values—the greatest performers—in the industry.

REX

CONSTRUCTION
EQUIPMENT

This coupon brings the NEW CATALOG on the Rex 5-S, 7-S and 10-S; a new story of value and performance.

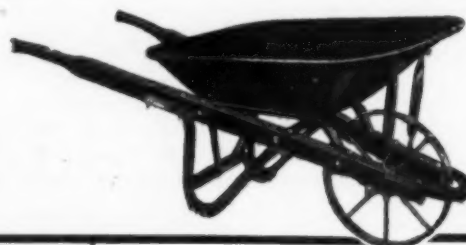
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Dependability—plus

First thought in the design and construction of all Bull Frog barrows, carts and scrapers is to insure the dependability vital to every contractor in holding down costs and maintaining his time schedule. But in addition to the strength and stamina characteristic of frame and tray construction as well as of the exclusive "Never-Break" wheel, Bull Frog engineers have achieved a nicety of balance and ease of handling that actually increase the productivity of the men on the job. The Bull Frog No. 42 barrow illustrated is an outstanding favorite with contractors for heavy duty work. Your supply house can show you this and other models to meet every contracting and industrial need—or if you prefer, write for catalog showing the complete line.

THE TOLEDO WHEELBARROW CO.
TOLEDO, OHIO

Branch Office and Warehouse: CHICAGO—520 West Erie St.

BULL FROG
WHEELBARROWS



The new Goodyear Dock under construction.



One of 12 Sullivan Hoists which erected the sheathing.

Link in World Zeppelin Service finished on schedule

Sullivan Hoists erect largest airship dock

Three miles southeast of Akron, Ohio, Sullivan Hoists helped erect the largest airship dock in the world.

The floor is large enough for ten football fields. Yet it is dwarfed by the roof, which could shelter several Graf Zeppelins.

It was in hoisting material for constructing the roof, that Sullivan hoists lent speed.

Twelve Turbinair hoists were put on

the job. They weighed only 345 lbs. each, but lifted a ton on single line at

110 feet a minute. Some of the hoists used had oversize drum flanges, to take care of the high lifts.

As the work progressed, the powerful little machines were moved easily to new positions.

There are 32 different models in the Sullivan Hoist line. One, two, and three-drum hoists, from 3 to 75 H.P. are available, for lifting material, setting steel and stone, operating derricks, pulling cars, handling scrapers, for scores of other tasks.

Send for Hoist Catalogs and the picture book "Speed Up With Air"



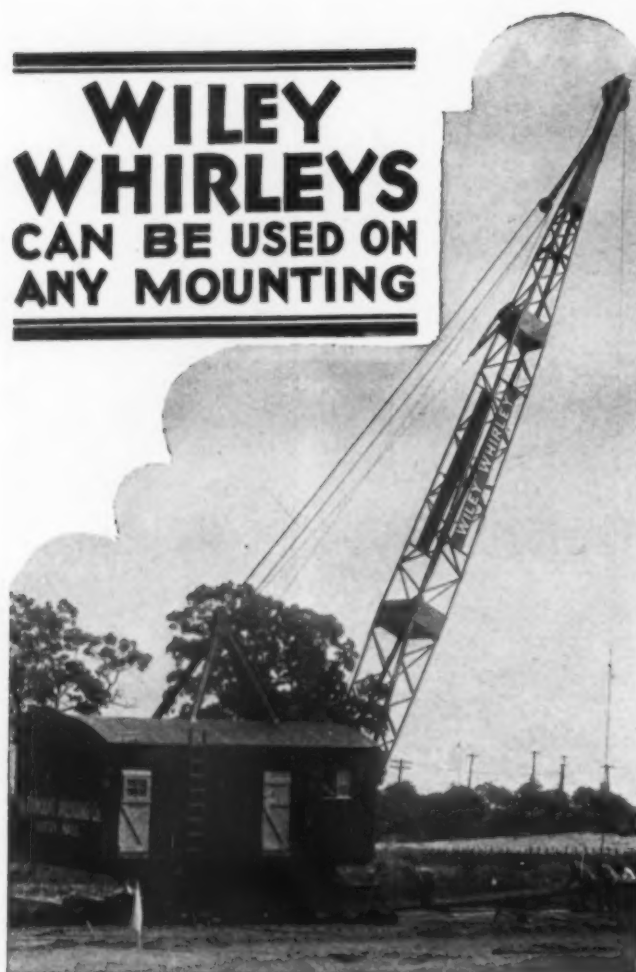
SULLIVAN AIR POWER EQUIPMENT

Sullivan Machinery Company

816 Wrigley Bldg., Chicago

30 Church St., New York

WILEY WHIRLEYS CAN BE USED ON ANY MOUNTING



WILEY WHIRLEYS can be mounted on any kind of base, stationary or movable. Due to this flexibility they can readily meet almost any job requirement as to mounting. Stationary foundations usually take the form of a concrete pier. Where mobility is important, track wheels or skids and rollers can be used. Often steel gantries are convenient in providing greater height of base and allowing underpass for cars. Gantries may be stationary or on wheels and they may be self-propelled if desired. Barge mounting is one of the commonest and most useful types of mounting. Here the perfect balance of Wiley Whirleys plays a part in minimizing the listing of the barge.

Investigate Wiley Whirleys for the next job. We shall be glad to tell you whether you can use them profitably.

The Dayton-Whirley Co.
DAYTON, OHIO

"Anchor" Pays for itself in a week by time, money and labor saved. Handy on every job.



Puller-jack

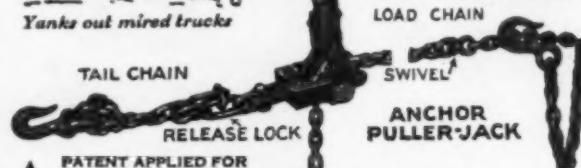
Only \$36



Yanks out mired trucks



Handles heavy machinery



PATENT APPLIED FOR

A ONE-MAN outfit that does the work of a gang. Spots railroad cars, draws concrete forms, shifts tracks, handy on steel erection, warping barges, wrecking, tightens guy wires—lifts, shifts, pulls, holds. 1,000 uses on every job. Good for 10,000 lbs. pull.

At your jobbers or order direct. Outfit includes 3½-ft. tail chain, 15-ft. load chain and sheave block—for changing direction or double-strength pull. Complete \$36.00 f. o. b. works, Reynoldsville, Pa. (Longer chains quoted). Write for bulletin No. 25.

T. H. EDELBLUTE COMPANY

Oliver Building S Pittsburgh, Pa.

Also Manufacturers of "Anchor" Track Braces and "Anchor" Rerailers



Easily handled by one man



STREET DERRICKS

GUY DERRICKS or STIFFLEG DERRICKS

Used With STREET HOISTS. Powered by Steam, Gasoline or Electric Make an Ideal Set Up.

**STREET BROS. MACHINE
WORKS, INC.**
CHATTANOOGA, TENN.



Contractors: Cut costs this way..

Here's a sound plan that has proved practical for thousands of contractors and other successful business men: To cut your hauling costs, put a Dodge Truck to work.

Dodge Trucks are confirmed money-savers for these reasons: They have the power you need for hill, hole or soft ground. Provide the speed that enables you to make more trips and save more time. Insure the dependability you want for year-after-year adherence to schedules. Attract patronage by their fine appearance. Please drivers by their roadability, comfort and handling ease. Are so designed and built that economy and long life are definitely assured.

See your Dodge Brothers dealer. Inspect Dodge Trucks. Compare them. Drive one. Choose from 124 standard types, ranging in capacity from $\frac{1}{2}$ -ton to 3-tons. Buy one complete with body. Rest assured that it will cut your costs — increase your profits.

DODGE TRUCKS

On a well-point job in South Chicago

A Humdinger self-priming centrifugal pump maintained a vacuum of 26 inches on a total of eighty-four 1½-inch well points, keeping the surrounding water level well below the bottom of the trench. Our standard 4-inch model with four-cylinder Le Roi engine, \$675 f.o.b. factory. We gladly furnish information on all models.



HUMDINGER SELF-PRIMING CENTRIFUGAL PUMP

Takes water as it comes to hose—continuous automatic prime, large air capacity—passes all kinds of mud and sand—nothing can get out of order—3-vane chrome alloy impeller, stainless steel shaft. Made in 5 different models, 100 to 1,500 G.P.M. capacity.

Ralph B. Carter Co., Hackensack, N. J.

BARNES Self Priming CENTRIFUGALS

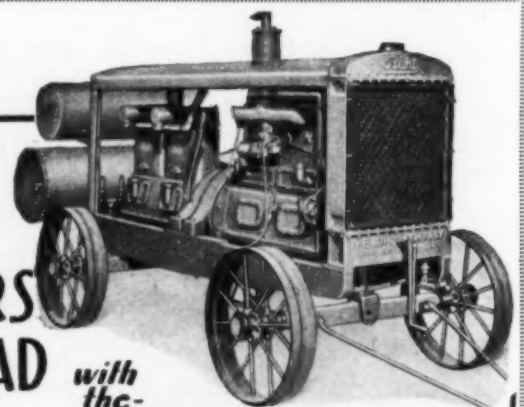
**MOVE
WATER
FASTER**

Pumping is fast and positive with the new Barnes Self-Priming Centrifugal. Even a leaky suction line will not stop the pumping. Self-priming on any suction lift up to 27 feet. Capacities from 250 to 3000 gallons per minute. Write for full information.

THE BARNES MANUFACTURING CO.
Mansfield, Ohio

Get
YEARS
AHEAD

with
the-



BUHL

PORTABLE
AIR COMPRESSOR

Users of Buhl Compressors are setting a new low record of costs on construction work of all kinds. Due to many remarkable improvements, exclusive with the Buhl, it is producing air with an economy and a dependability never before considered possible.

Buhl compressors are obtainable in 36, 55, 90, 110, 220 and 330 cu.ft. capacities.

Write for descriptive Bulletin

The **Buhl** Company

Old Colony Bldg.
CHICAGO





Haddon Hall, Atlantic City, N. J. Architects: Rankin & Kellogg Contractors: Turner Construction Co.

PLACED
WEDNESDAY, 9 A.M.

FORMS STRIPPED
WEDNESDAY, 5 P.M.

SHORES REMOVED
FRIDAY 9 A.M.



FORMS for the floor slabs in Haddon Hall, Atlantic City, were stripped 8 hours after placing and shores removed in 48 hours. In some cases forms for the second-story slabs were shored, reinforcement placed, ready for concreting in less than 24 hours after placing the first-floor slab.

Speed such as this, obtained by using "INCOR" Cement, makes possible new economies all along the line. Overhead is lowered. Equipment is released sooner. Costly delays are ended. Labor is reduced. More and larger contracts can be completed in one construction season. "INCOR" is a perfected high-early-strength Portland Cement. It contains no admixtures . . . requires no special methods of handling.

"INCOR"* combines the outstanding quality of Lone Star Cement with the added advantage that it produces *Portland Cement* concrete ready to use in 24 hours.

* Reg U. S. Pat. Off.



"LONE STAR" and "INCOR" Cements
made and sold by

LONE STAR CEMENT COMPANY ALABAMA
LONE STAR CEMENT CO. INDIANA, Inc.
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Signature

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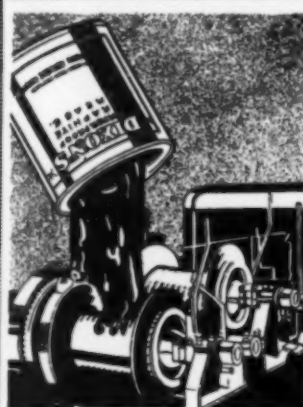
City and State

Name of Company

Occupation

(To insure prompt shipment write plainly and fill in all lines.)

C.M. 6-30



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CHAINS, PUMP PLUNGERS ETC.

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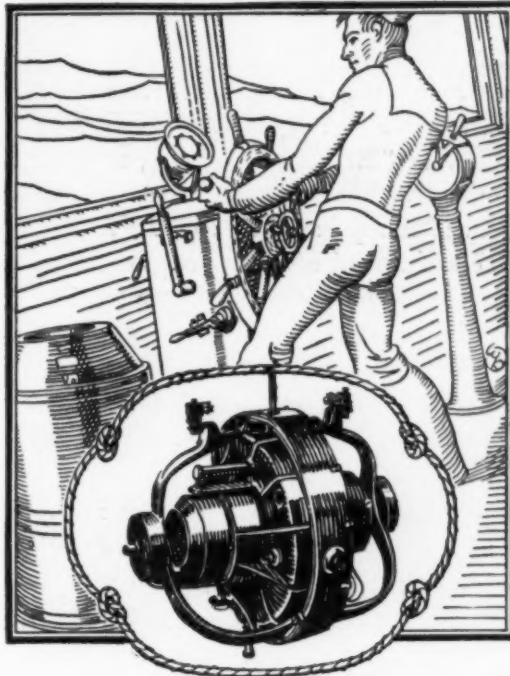
Your Business Paper
Marks a True Course



HIGH up in the wheelhouse of a ship there spins a gyroscopic compass, pointing ever at True North. With automatic precision it warns the navigator of the slightest deviation from his course. By its aid he steers his ship unerringly across the waste of waters to its destined port.

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It is this function of the industrial and merchandising press, no less than its service



as a source of news and data, which makes it a power to be reckoned with in business affairs. For the modern business paper is an essential factor in every progressive industry. By its competence in the gathering and presentation of information, it has made itself indispensable. For its independence in the editorial inter-

pretation of that information it has become respected. It is a strong organization, efficiently staffed and capably administered. It commands a sound, paid, audited circulation. Its news and editorial pages are unbiased and unbuyable.

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Knife blade cutter wheels furnished as standard equipment or thick wheels, if you want them. These time savers for the construction man are



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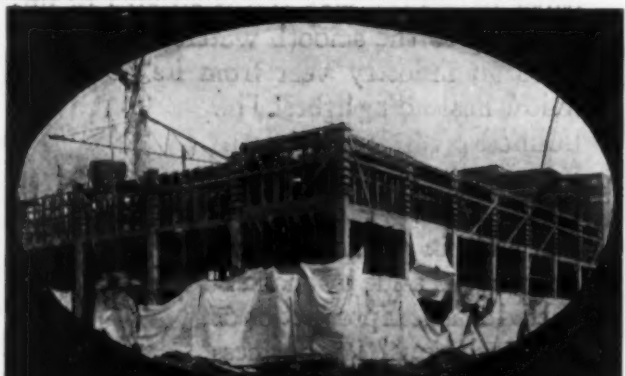
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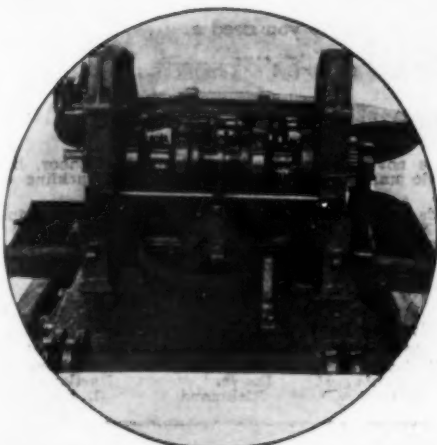
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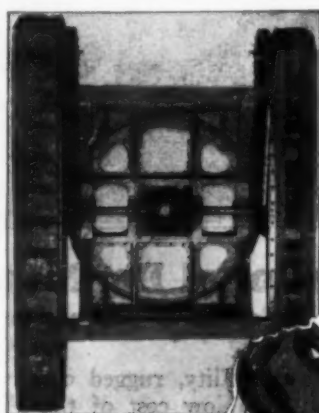
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Machinery table with drums removed, showing steering and propelling clutches, all inside cab. No clutches or brakes under car body.



Add SPEED to MOBILITY ... in Shovel Work

Mobility alone is not enough when you can add SPEED to steering and propelling. And this speed is obtainable in the exclusive patented feature of the BAY-CITY MODEL K $\frac{1}{2}$ -yard Shovel.

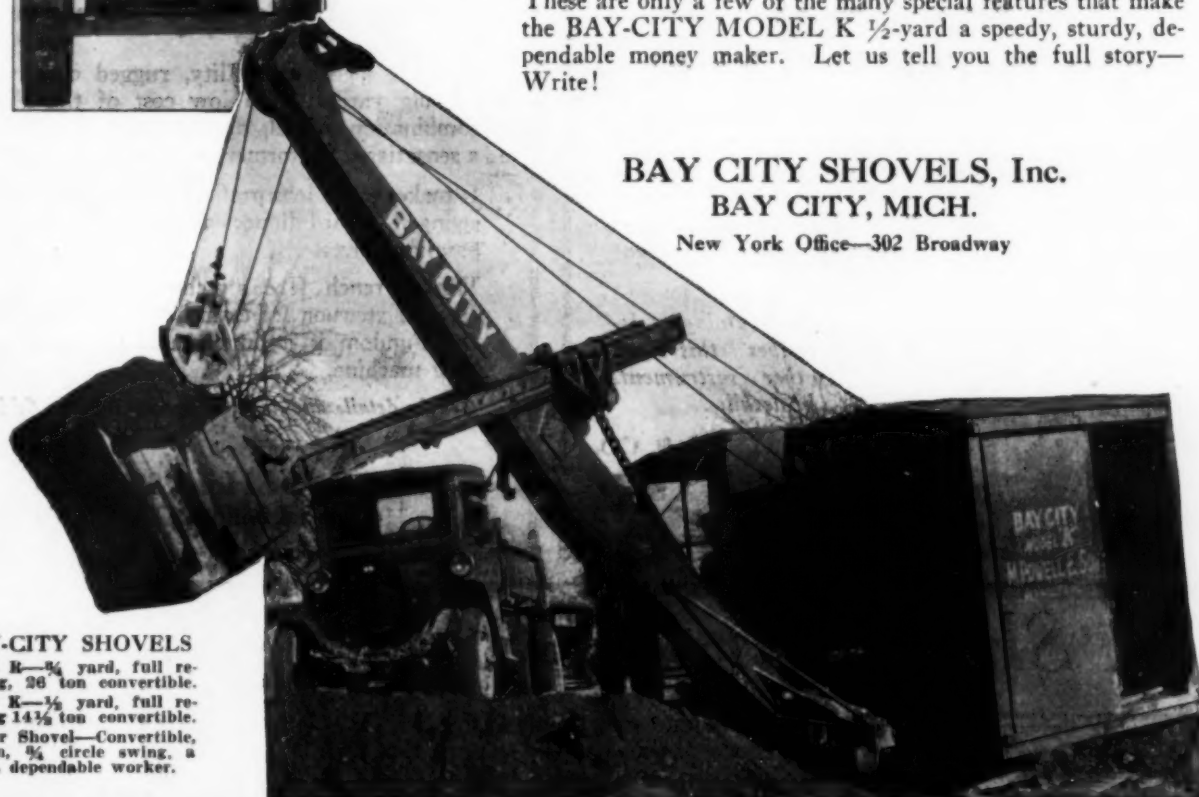
Model K is the only full revolving, full crawler mounted power shovel which is steered and propelled with the crawlers independently operated through separate clutches. This makes it possible to turn by propelling one crawler and reversing the other. There are no clutches under the car body . . . all clutches are located inside the cab where they are dry and accessible for oiling or adjustments.

Thus SPEED is added to MOBILITY. And this is only one of the many features. In addition, line speed is high, with excess power to dig through rough material. All shafting is mounted on Ball or Roller Bearings, cutting loss of power to a minimum. Absolute control of dipper is possible through quick acting independent chain crowd. Extremely short (7-ft.) tail swing for operation in cramped quarters. 72 in. diam. Roller Path. 8 in. diam. center pin.

These are only a few of the many special features that make the BAY-CITY MODEL K $\frac{1}{2}$ -yard a speedy, sturdy, dependable money maker. Let us tell you the full story—Write!

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BAY CITY, MICH.

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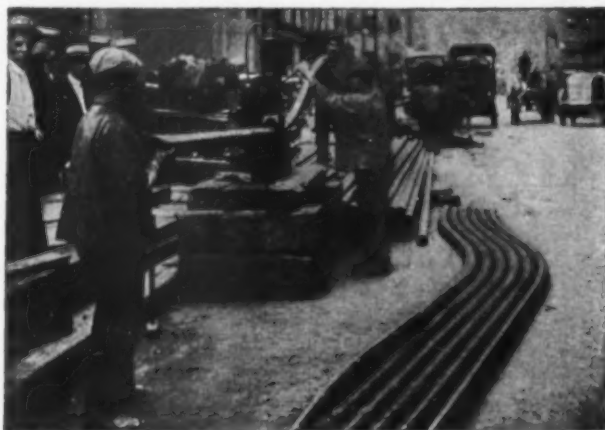


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Model K— $\frac{1}{2}$ yard, full revolving, 26 ton convertible.
Model K— $\frac{3}{4}$ yard, full revolving 14 $\frac{1}{2}$ ton convertible.
Tractor Shovel—Convertible, 10 ton, $\frac{1}{4}$ circle swing, a fast, dependable worker.

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THE BAY-CITY FAMILY
OF FAST WORKERS



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These machines are not only rapid and economical of labor, but the bends are made uniform and without danger of buckling or crushing.

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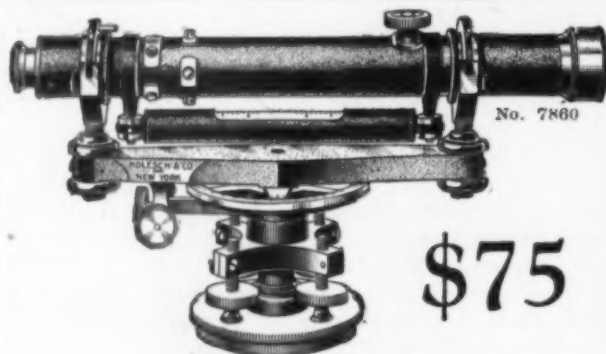
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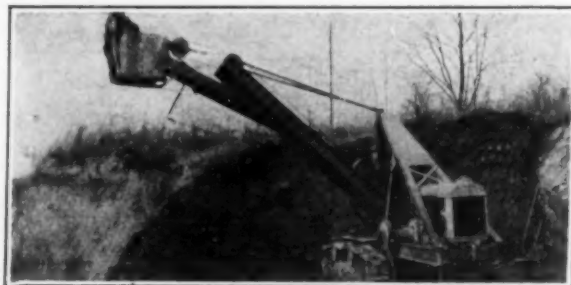
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THE speed, versatility, rugged construction, big yardage and low cost of the Fundom combination shovel, ditcher and crane, make it a sensational performer and money saver.

It makes small jobs profitable. Fast, full $\frac{3}{4}$ circle swing, $\frac{1}{3}$ yard dipper capacity, $16\frac{1}{2}$ foot radius, gasoline power.

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SABIN CO., Gloves

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- ☐ Enclosed find \$1.40 for sample pair your No. 1510 glove, size.....
☐ Please quote us price onDoz. pair No. 1510 gloves, sizes.....

Name

Address

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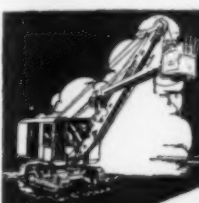
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Send the coupon.



SABIN CO.—Gloves
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Youngstown, Ohio

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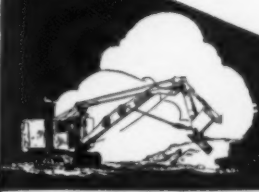
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6-10-12-15-17 and
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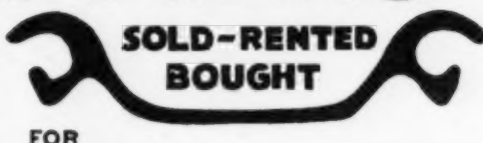
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Aaron Buchsbaum Co., New York, N. Y.
MACK MODEL BG



The J. E. Smith Company, Baltimore, Md.
2 MACK MODEL BG TRUCKS



Albert Loon & Son, Perth Amboy, N. J.
10 MACK MODEL BG TRUCKS



General Electric Co., Atlanta, Ga.
MACK MODEL BG

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Porteous, Mitchell & Braun, Portland, Me.
MACK MODEL BL



Standard Oil Company of Louisiana
8 MACK MODEL BG TRUCKS
4 " " BL " "



Texas Company, New York, N. Y.
31 MACK MODEL BG TRUCKS



Shell Eastern Petroleum Co., New York,
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Neuhoof Packing Co., Nashville, Tenn.
MACK MODEL BG

ORDERS
such as these
WELCOME



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MACK MODEL BL

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TRUCKS • BUSES • FIRE APPARATUS • LOCOMOTIVES

MAINTENANCE



Although this is its nineteenth year of service, this TEXACO Asphalt Macadam pavement on Mason Street, Springfield, Mass., has required no maintenance.

19 years' service under the steady traffic of a business thoroughfare will ferret out a pavement's weak spots, if such exist.

And in 19 years, an inferior pavement subjected to traffic such as that on Mason Street, Springfield, Mass., can accumulate a discouraging maintenance bill.

The TEXACO Asphalt Macadam pavement on this Springfield thoroughfare has weathered the traffic of 19 years, without requiring any expenditure for maintenance.

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